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CONTENTS

Management: the intellectual challenge — B. R. ASTON *and* M. B. BRODIE 7

Aslib past and future — R. S. HUTTON 19

The mechanization of serial records, with particular reference to subscription control — M. A. SCOONES 45

FAIR (fast access information retrieval) project; aims and methods — A. G. A. PICKFORD 79

Training in the use of biological literature — H. V. WYATT *and* R. T. BOTTLE 107

A data bank: the Social and Economic Archive Centre — DAPHNE GROSE 126

Some aspects of industrial classification in the Soviet Union — T. J. GRAYSON 129

Computer-aided typesetting — A. WEYMAN *and* J. DAVIS 146

The future of information work — W. E. BATTEN 163

The Cranfield tests on index language devices — CYRIL CLEVERDON 173

The use of links and roles on a pre-co-ordination basis in optical coincidence systems — K. P. JONES 195

Research and development at Aslib 200

Copyright and library photocopying: the practical problems — G. WOLEDGE 217

Microforms in information retrieval and communication systems — BERNARD J. S. WILLIAMS 223

Adaptation to users' needs — A. MAUPERON 232

The next hundred weeks in chemical information — G. A. SOMERFIELD 255

Periodicals held in the Aslib library — YVONNE FOY 260

Aslib Chemical Group 1967 conference 272

The logic of co-ordinate indexing — J. L. JOLLEY 295

Thesaurus construction and use — KATHLEEN GASTER 310

Patent information services — V. TARNOFSKY 332

Communication: a teach-in for computer software specialists and documentalists — W. E. BATTEN (*Chairman*) 351

- The retrieval process — B. C. VICKERY 352
- What computers will do — STANLEY GILL 358
- Comparison of the philosophy of indexing text with that of indexing structural formulae — A. K. KENT 364
- The use of the computer in information work — HELEN TOWNLEY 369
- Use of package programs for information processing — E. MASSEY 381

The 41st Aslib Annual Conference at Harrogate

The one-man information unit—utilizing the Aslib network H. THORNTON 402

Time to think—use of the systems approach to the problems of the one-man information unit T. WHITEHALL 406

Organizational nuclei and information catalysts B. T. STERN 416

The Bridge Index: an exercise in current awareness J. W. F. BROWN 421

The power game: information bulletins for the Central Electricity Generating Board R. W. PRIOR 424

Organizing and planning Siraid and other services of Sira's Industrial Communications Group J. M. MYERS 430

CALCUTTA UNIVERSITY

ASLIB PROCEEDINGS

INDEX

Volume 19, 1967

INDEX

Aslib
Branches:
Midlands, representative on Council, 215
Northern, representative on Council, 216
Scottish, annual general meeting and conference (1967), 1, 74; (1968), 327; meetings, 1, 287, 348
Committees, 289–91
Conferences:
annual (1966) papers, 7–18; (1967), 1, papers, 402–40; computer teach-in, 73; 74–5, papers 351–86; International Conference on Education for Scientific Information Work, 120
Council, 215–6
Courses: 396, 397–400
business archives, 287
business information, 294
business records: junior introductory, 288
co-ordinate indexing, 328
handling Soviet and East European materials, 249, 251
junior introductory 211, 212, 250, 294
patents, 1
senior introductory, 119, 120, 347
DES Committee on short courses, membership of, 349
Director, 19, 159
Groups:
Aeronautical, conferences, 1, 121
Biological, 348; annual general meeting, 121; conference on biomedical engineering, 396
Chemical, annual general meeting, 1, 2, 158; conference, 1, 2, 158; courses, 1, 2, 250; liaison officer, 158; meeting, 327, 328; report of 1967 conference, 272–7
Co-ordinate Indexing, 388; committee, 74; meeting, 119
Economics, 3
Engineering, conferences, 1, 2, 327, 396; meetings, 41–4, 249, 250; visit to National Engineering Laboratory, 37, 38
Film Libraries, meeting, 1
Mechanization Study, meeting, 347
Technical Translation, 254; meetings, 73, 211, 287
Textile, annual general meeting, 101
Transport, conferences, 1, 211, 291–2; visit, 211
History, 19–28, 64–5
Hon. Secretary, 215
Hon. Treasurer, 215
Library, 260–71, 310–7
Meetings: AIDS, 1; annual general, 119; annual lecture (1967), 38, 73; (1968), 347; Christmas party, 211, 348; computer, what it is and what it can do, 395; facts and how to find them, 347; Kent service (Chemical Society SDI), 348–9; 'Many questions', 395, 397; Nuclear Science Abstracts, 288, 327; patent information services, 119, 125; role of information service in industrial disputes, 287, 293; standards information, 211, 212; suggestions, 250; visit to PLA, 110; World Institute for Documentation of Housing, Planning and Building, 327, 348
National Reprographic Centre for documentation, committee, 3
New members, 77–8, 162, 214, 320–1
President, 215
Research, 146–9, 200–3
Staff, 158, 216, 288
Tape typewriter, 292
AIDS (Automation Instrument Data Service), 1, 124
'Adaptation to users' needs', 232–40
Advances in Colloid and Interface Science, 125
Advisory Committee on Scientific and Technical Information, 202
Advisory Council on Scientific Policy, 24
Agard Evans, B., *see* Evans, B. Agard
Aids, 105
Anglo-Czechoslovakian Information Symposium, 212–3
Anthony, L. J., 215, 288
Aperture cards, 224
Armstrong, A. F., 215
Arnold, D. V., 215, 290; letter, 63–4
Ashton, A. C. W., 290
Ashworth, W., 215, 290, 291
Aslib directory, 22
'Aslib past and future', 19–28; correspondence, 64–5
Association of Assistant Librarians, 398
Association of British Library Schools, 289, 349
Aston, B. R., *and* Brodie, M. B., 'Management: the intellectual challenge', 7–18
Aston University, 202
Atkins, J. L., 215, 291
Auger, C. P., 396
Austin, E. A., 5

BNB, *see* British National Bibliography
BSI Standards Associates' Section, 211
Baker, E. A., 349
Barbour, W., 21

INDEX

Barnes, R. M., 290
Barret, A. J., speaker, Aeronautical Group, 121
Barwick, G. F., 22
Batten, W. E., 38, 92, 93, 94, 95, 289, 291, 329, 348, 365; 'The future of information work', 163–72; chairman, Co-ordinate Indexing Group, 74; chairman, joint Aslib/British Computer Society meeting, 351
Baxendale, Phyllis, 172
Beaver, Sir Hugh, 21
Besterman, T., 23
Bibliographic Systems Centre, Western Reserve University, 104
Biological Engineering Society, 396
Biological literature, 107–10, 241, 318
Biomedical engineering, 79
Biske, V., 415, 429
Blackwell, B. H., Ltd., 292
Blackwell, Julian, 5, 215, 290, 291
Blagden, J. F., 194, 198
Bodleian Library, 350
Bottle, R. T., *and* Wyatt, H. V., 'Training in the use of biological literature', 107–10; correspondence, 241, 318
Bourton, K., speaker, Engineering Group, 250
Boyd, G. M., 74, 93, 309
Boyle, H. C., speaker, Transport Group, 292
Bradford, S. P., 21, 24
'Bridge Index: an exercise in current awareness', 421–3
Brimelow, T., 215, 289
British Archive of Survey Data, 127
British Computer Society, 351
British National Bibliography, 203, 349
British Non-Ferrous Metals Research Association, 25
British Scientific Instruments Research Association, *see* Sira
British Technology Index, 40
British Union Catalogue of Periodicals, 23
Brodie, M. B., *and* Aston, B. R., 'Management: the intellectual challenge', 7–18
Broome, E., speaker, Aslib evening meeting, 349
Brown, A. S., speaker, Scottish Branch, 287, 291
Brown, D. G., 161
Brown, J. W. F., 'The Bridge Index: an exercise in current awareness', 421–3
Bubb, A. C., 5, 215, 289
Bullock, 23
Burger, G., 415
Business Archives Council, 288
Business studies, 251

COBOL, 146–9
California University, 396–7
Cambridge University, 159–60
Campbell, D. J., 195, 215, 290, 340, 428
Carey, R. J. P., 39
Carter, E. J., 23, 27
Cataloguing, computer based, 349
Cawkell, A. E., 39, 193
Central Electricity Generating Board, 424–7
Chemical Abstracts, 164, 255, 257, 258
Chemical Abstracts Service, 4, 364–8
Chemical-Biological Activities, 255, 364–8
Chemical industry, 2
Chemical Society, 4, 364
Chemical Titles, 255, 364–8
Chemistry, conference, 272–7
Chemistry, information, 255–9
Chilton, A., speaker, afternoon meeting, 395
Christie, D., 39
Chubb, L. W., 2, 328
Churchman, C. W., 13
Ciba Foundation, 123, 212
City University, 4
Classification, 173–94
Clearinghouse for bibliographic systems, Western Reserve University, 104
Cleverdon, C. W., 215, 290, 291; 'The Cranfield tests on index language devices', 173–94; speaker, Aeronautical Group, 121
Clifton, P. A., speaker, Technical Translation Group, 73
Cloke, J. E., 18, 215, 290
Coates, E. J., 40
Codlin, Ellen M., 214
Colby, V., 161
Cole, P. F., 158; letter, 29
Coleman, R., 56
Colinese, P. E., 289
College of Aeronautics, Cranfield, 123
Collison, R. L., speaker, evening meeting, 211, 212
'Communication: a teach-in for computer software specialists and documentalists', 351–86
'Comparison of the philosophy of indexing text with that of indexing structural formulae', 364–8
'Computer-aided typesetting', 146–9
Computer software specialists, teach-in, 351–86
Conferences, *see* also Aslib Conferences
  Anglo-Czechoslovakian Information Symposium, 212–3
  DRTC Seminar, 103
  International Conference on Mechanized Information Storage and Retrieval Systems, 213
  Libraries and the book trade, 103
  Library market for scientific and technical information, 5
Conjoint Board of Scientific Societies, 22, 24
Co-ordinate indexing, 75, 79–95, 119, 173–94, 195–9, 295–309, 310–7
Copinger and Skone James, 221
'Copyright and library photocopying: the practical problems', 217–22
Couldrey, M., 27

Courses, 397–400; *see* also Aslib Courses
classification for information retrieval, 216
information science, 122
indexing, 103
librarianship, 251
library assistants, 254
MSc in information science, 4
microfilm, document reproduction, etc., 329
Scottish summer school, 103
use of biological literature, 329
'Cranfield tests on index language devices', 173–94
Criminology, 104
Cumulated UDC supplement (–1964), 160
Current awareness, 421–3
Cyert, R. M., 11

Dammers, H. F., 74, 94, 290
'Data bank: the Social and Economic Archive Centre', 126–8
David, V. W., speaker, Chemical Group, 2, 158; summary of paper by, 272–3
Davis, J., *and* Weyman, A., 'Computer-aided typesetting', 146–9
Dawson, D. R., 215, 290, 291, 420
Day, J., 41–4
Dean, N. B., 94
Defense Documentation Center, 227
Department of Education and Science, 216, 349
Department of Scientific and Industrial Research, 24
Desch, C. H., 23
Deutsche Gesellschaft fur Photographie, 39
'Developing user independence', 63–4
Dewey Decimal Classification, 196
Dews, J. D., 252
Directory of British Associations, 397
Ditmas, E. M. R., 19, 23, 27
Documentation periodicals, 260–71
Documentation Processing Centre, Manchester, 252
Documentation Research and Training Centre, Bangalore, 103
Dodd, A. R., 420
Durrad, E. S., 22, 23
Dutton, B. G., 414
Duyverman, S. D., 102
Dyson, G. M., 216, 290

East, Harry, 328
Easton, W. A. G., 39
Edmonds, Paul, 5
Education, 120, 159, *see also* Courses, Aslib Courses
Edwards, A. P. J., 216
Edwards, P. I., 348
Edwards, S. A. B., speaker, Engineering Group, 2
Eldridge, A. A., 21
Euratom, 232–40
European authors, 1000–1900, 161
Evans, B. Agard, 414; speaker, evening meeting, 348
Eve, C. J., 414, 439
Evison, L., speaker, Engineering Group, 2
Ewell County Technical College, 254

FID, *see* International Federation for Documentation
Faceted classification, 175–94
Fair copying, 217–22
Farradane, J., 159, 170, 197
Feather, Victor, speaker, evening meeting, 287
Fidgeon, P. L., speaker, Transport Group, 291
Films, 1
Fleming, Sir Arthur, 21
Forms, 411, 415
Forrester, J., 13
Foskett, D. J., 349
Foster, A. Gordon, 420
Foy, Yvonne, 'Periodicals held in the Aslib library as at 15th July 1967', 260–1
Francis, Sir Frank, speaker, Aslib annual lecture (1968), 347
Francis, S., 215, 289, 415
Freytag, H. E. L., 339
Fryers, M. D., speaker, Chemical Group, 2, 158; summary of paper by, 273
Fullman, B., 19–27
'Future of information work', 163–72

Gallagher, P., speaker, Chemical Group, 328
Garrett, V., 21
Gaster, Kathleen, 'Thesaurus construction and use; a selective bibliography, 310–7
Gauntlett, M. D., 429
Geographical names, 105
Gill, Claude, 5
Gill, Stanley, 'What computers will do', 358–63
Glaser, G., 428
Glossary of geographical names, 105
Goodearl, 340
Goom, H. H., 215, 289
Gordon, L. L., speaker, Transport Group 292
Gosset, M., 19–27
Goyer, M., 254
Graham, F. A., 290
Grayson, T. J., 'Some aspects of industrial classification in the Soviet Union', 129–45
Grenfell, David, 6
Gregory, Sir Richard, 22
Griffin, R. G., 215, 290
Grose, Daphne, 3, 121; 'A data bank: the Social and Economic Archive Centre', 126–8
Grosse deutsche Wörterbuch, Das, 124–5
Guillan, S. P., 20, 27

Hadfield, Sir Robert, 21
Hall, J. G., 428, 429
Hallan, A. J., 309
Handlist of basic reference material for librarians and information officers in electrical and electronic engineering, 214
Hanson, C. W., 158–9
Harding, C. E., 74
Hart, G. W., 93
Harvey, J. M., speaker, Transport Group, 292
Hatfield College of Technology, 329, 399, 400
Heilprin, L. B., 228
Henderson, G. P., 216, 290
Hewetson, C. E. C., 215, 290
Hill, M. W., 428
Hogg, F. N., speaker, Scottish Branch, 74
Holloway, A. H., 215, 291, 414
Hospital Physicists Association, 396
Hudson, S., 290
Hulme, E. W., 22

IATUL Seminar 1967, 75
ICIREPAT, *see* International Co-operation in Information Retrieval among Examining Patent Offices
Indata, 124
Index language devices, 173–94
Index to theses, 203
Indexing, 364–8; *see* also Co-ordinate Indexing
Indexing, course, 102–3
Industrial classification, 129–45
'Industrial engineer', 41
Industrial Training Symposium, proceedings, 330
Information retrieval, 223–31, 351–86
Information science, 163–72; MSc in, 4; PhD in, 159
Information Scientist, 293
Information Storage and Retrieval, 213
Institute for Scientific Information, 39
Institute of Information Scientists, 1, 4, 120, 349, 396
Institute of Petroleum discussion group, 37, 38
Institute of Physics, 41
International Classification of Patents for Invention, 337
International Conference on Education for Scientific Information Work, 120
International Conference on Mechanized Information Storage and Retrieval Systems, 213
International Congress on Reprography, 39
International Co-operation in Information Retrieval among Examining Patent Offices, 335–57
International directory of translators and interpreters, 253
International Federation for Documentation, 401; FID/IFIP Conference, 102
International Federation for Information Processing, 102, 159
Internationales Bibliotheksadressbuch, 401
Inventory of surveys, 122

Jackson, A. H., speaker, Chemical Group, 328
Jolley, J. L., 74, 75, 328; letter, 387–8; 'The logic of co-ordinate indexing', 295–309; correspondence, 387–8
Jones, J., 92, 93
Jones, K. P., 'The use of links and roles on a pre-co-ordinate basis in optical coincidence systems', 195–9

KWIC, KWAC, KWOC, 366
Kent, A. K., 74; 'Comparison of the philosophy of indexing text with that of indexing structural formulae', 364–8; speaker, Chemical Group, 327; speaker, evening meeting, 348–9
Kings Norton, Lord, 215
Kunitz, S. J., 161

LA Academic Reprints, 252–3
Lana, G., 105
Lancaster-Jones, E., 21
Lancaster-Jones, J., 289, 401
Languages, 75–6, 123
Leeds College of Commerce, 122, 398
Leeds University, 4
Leigh, C. W. E., 22
Letters to the editor, 29, 63–5, 111, 241, 278, 318, 387–8
Lewis, V., letter, 387
Libraries and the book trade, conference, 103
Libraries, history, 19–27
Libraries, industrial, 402–5, 406–14
Library and Information Bulletin, 105
Library Association, 3, 105, 161, 252–3, 289, 290, 293, 349, 400
Library co-operation, 1
Library instruction in further education, 39
Library management studies, 111
Library of Congress, 350
Library science, periodicals, 260–71
Liebesny, Felix, 5, 44, 215, 289, 291, 420
Line, M. B., 56, 290
Links, 195–9
Lintott, E. R. C., 415
List of translations notified to ETC, 254
Liverpool School of Librarianship, 103, 216
'Logic of co-ordinate indexing', 295–309; correspondence, 387–8
London University College, School of Librarianship, 111
London University, Institute of Education 202
Loughborough University, 398
Lupton, T., 9
Lynch, Michael, 365
Lyons, Sir Henry, 21

MARC Project, 203, 350
McClelland, R. M., 328
MacKenzie, A. G., 290
McLeish, A., 22
Mack, E., speaker, evening meeting, 395, 397
Magnetic tape, 226–7
Maidment, W. R., 215, 289, 291
'Management: the intellectual challenge', 7–18
Manuscripts (USA), 6
Mardi, J. G., 11
Marns, J. H. R., 439
Marples, D. L., 15
Martin, M., 17
Martyn, J., 108
Mason, Sir Frank, 215
Mass Spectrometry Bulletin, 38–9
Mass Spectrometry Data Centre, 38
Massey, E., 'Use of package programs for information processing', 381–6
Mauperon, M. A., 121; 'Adaptation to users' needs', 232–40
May, D. H., 290
'Mechanization of serial records', 45–62
Medical librarianship, course, 40
Medical Research Council, 79
Medlars, 107, 164, 240
Microfiche, 86
Microfilm Association of Great Britain, 3
'Microforms in information retrieval and communication systems', 223–31
Minter, A. L., speaker, Engineering Group, 42–3
Mitchell, P. C., 22

NLL, *see* National Lending Library for Science and Technology
NRCd, *see* National Reprographic Centre for documentation, 329
NRLSI, *see* National Reference Library for Science and Invention
National Aeronautics and Space Administration, 352
National Central Library, 5
National Institute for Medical Research, 79
National Lending Library for Science and Technology, 24, 108; courses, 398, 400; forms, 411; translations survey, 123
National Reference Library for Science and Invention, 105, 428
National Reprographic Centre for documentation, 3, 228, 231, 329; Technical Evaluation Report no. 1, 329–30
Neal, K. W., 39
Needham, K., 193
Newby, F., 216
Newcastle Seminar on the Organization and Handling of Bibliographical Records by Computer, 213
Newcastle upon Tyne University, 159–60
Newcombe, D., 290
'Next hundred weeks in chemical information', 257–9
Nicholls, A., 290
North-Western Polytechnic, 5
Nuclear Science Abstracts, 232

OSTI, *see* Office for Scientific and Technical Information
Office for Scientific and Technical Information (OSTI), 3, 4, 40, 48, 76, 104, 120, 122, 159, 200, 201, 212, 251–2, 255, 290, 291, 349, 417, 420; observer on Council, 216
Official Journal (Patents), 333
'One-man information unit—utilizing the Aslib network', 402–5
'Organizational nuclei and information catalysts', 416–20
'Organizing and planning Siraid and other services of Sira's industrial communications group', 430–40

PCMI, *see* Photochromic micro-image
PERT, 433
Package programs, 381–6
Page, E. S., 40
Paige, M. F. C., 216
Parker, E. W., 22, 27
Pate, A. G., 396
'Patent information services', 332–41
Patent Office, 24, 332–41
Paterson, G. M., 290
Patrick, L. G., 289
Pearce, J. G., 21; letter, 64–5
'Periodicals held in the Aslib library as at 15th July 1967', 260–71
Periodicals, price survey, 292–3; records, 45–62
Perrault, J. M., 197
Pharmaceuticals, 273, 275–6
Photochromic micro-image (PCMI), 225–6
Photocopy service (NRLSI Aids to readers), 105
Photocopying, 217–22
Photocopying and the law, 217, 221
Physics Abstracts, 146, 202
Pickford, A. G. A., 396; 'FAIR (Fast Access Information Retrieval) Project', 79–95
Pile, C., letter, 241
Plasmen physics SDI, 104
Plastics, 273–4, 276–7
Pottage, M. Y., speaker, Aeronautical Group, 121
Power, E. B., 23
'Power game: information bulletins for the CEGB', 424–8
Price, D. J. de S., 11
Prior, R. W., 'The power game: information bulletins for the CEGB', 424–8
Programs, package, 381–6
Publishers Association, 217–22

Reardon, D. F., 102
Rees, Alan M., 29, 40

Relevance assessment, 29
Reprography, 39
'Research and development at Aslib', 200–3
Research Associations, 417, 420
Research projects, 293
Reserve holdings of Russian literature (NRLSI Aids to readers), 105
'Retrieval process', 353–7
Richnell, D. T., 76, 215, 289, 291
Ridley, A. F., 20, 21, 22
Rippon, J., 158
Roberts, F. B., 5
Roberts, J. T., 341
Rogers, C. E., 215, 290
Roles, 195–9
Rosenstock, H. M., 39
Roster of Indian scientific and technical translators, 253
Royal Society, 24
Rutherford, W. H., 215, 290, 291, 348
Rye, R. A., 22

SCONUL, 349
SEAC, *see* Social and Economic Archive Centre
SMART system, 182–7
Sabel, C., 94–5
Salton, G., 182–7
Saunders, W. L., 215, 289, 291; letter, 278
Sauvée, S., 216, 288
Schuchmann, Martin, 6
Schultze, R. S., 76–7, 350
Schur, H., letter, 278
Science Museum, 24
Science of Science Foundation, 123
Scoones, M. A., 'The mechanization of serial records, with particular reference to subscription control', 45–62
Scott, P. H., speaker, Chemical Group, 328
Scottish Library Association, 103
Searl, G. B., speaker, Mechanization Study Group, 347
Serials, records, mechanization, 45–62
Sewell, P. H., 289
Sewell, R., 396
Shackleton, Lord, 215
Sharp, J. R., 290, 429
Shaw, T. N., 193, 420
Sheffield University, 4
Shell International Petroleum Co., 45
Simkins, M. A., speaker, Chemical Group, 329
Simpson, D. J., 439
Simulation techniques, 430–40
Sinnett, J. D., 195–7
Sira (British Scientific Instruments Research Association), 430–40
Slater, M., 108
Smethurst, P. R., speaker, Transport Group, 291
Smith, F. H., 215; speaker, Aeronautical Group, 121
Smith, G. D., 123
Snel, R., 18, 74, 215
Snow, D. C., 340, 341
Social and Economic Archive Centre, 121, 126–8
Social science investigations, 40
Social Science Research Council, 251
Society for Research in Higher Education, 250
Society of Authors, 217–22
Sokolovsky, A. P., 133
'Some aspects of industrial classification in the Soviet Union', 129–45
Somerfield, G. A., 4, 158; 'The next hundred weeks in chemical information', 257–8
Soviet Union, industrial classification, 129–45
Specialized Information Centres, 122
Spurr, J., 94
Staffing, 409
Standards information, 211
Staveley, R., letter, 111
Stern, B. T., secretary, Chemical Group, 2, 250, 290; 'Organizational nuclei and information catalysts', 416–20
Stevens, P. D., 76
Stewart, J. D., 23
Stocks, J. R., 5, 18, 215, 291, 438
Structural formulae, 364–8
Studiecentrum voor Kriminologie . . ., 104
Styles, B. R., 38, 396
Subject guide to forthcoming books, 106
Subscription control, 45–62
Systems, 7–18, 406–14

Tarnofsky, V., 'Patent information services', 332–41
Taylor, F. R., 5, 215, 289, 290
Taylor, G. E., 429
Technical Book Review, 160–1
Technical Evaluation Report, 329–30
Technical Journals for Industry, 401
Technical Translations, 397
Terry, J. E., speaker, evening meeting, 287, 288
Thesaurus construction, 202
'Thesaurus construction and use; a selective bibliography . . .', 310–17
Thomas, G. W., speaker, Chemical Group, 328
Thompson, A. G., speaker, Engineering Group, 41–2
Thornton, H., 'The one-man information unit—utilizing the Aslib network', 402–5
'Time to think—use of the systems approach to the problems of the one-man information unit', 406–14
Tizard, Sir Henry, 21, 24
Tomlinson, Norman, 253
Townley, Helen, 74, 415; 'Use of the computer in information work', 369–80
'Training in the use of biological literature', 107–10; correspondence, 241, 318
Translations, 253–4
Translations (NRLSI Aids to readers), 105

Translations Register-Index, 397
Tyler, W. E., speaker, Scottish Branch, 74
Typesetting, computer-aided, 146–9

UDC, *see* Universal Decimal Classification
UMI Model 100 microfilm reader, 329
United Kingdom Atomic Energy Authority, 104
Uniterm system, 173–94
Universal Decimal Classification, 160, 173–94
Urquhart, D. J., 63
'Use of links and roles on a pre-co-ordinate basis in optical coincidence systems', 195–9
'Use of package programs for information processing', 381–6
'Use of the computer in information work', 369–80
Users' needs, 232–40

VINITI, 25
Van der Wolk, L. J., *see* Wolk, L. J. van der
Veasey, W. I., 18, 193, 292
Verdon-Smith, Sir Reginald, 215
Vernon, K. D. C., 215, 251, 290, 293
Vickery, B. C., 74, 193, 439; 'The retrieval process', 352–7; speaker, Engineering group, 2
Vonomatic P, 292

Walker, K. C., 292
Wansbrough-Jones, Sir Owen, 215
Warren, M. G., 22, 23
Washington State University Library, 122–3
Webb, A. R., 340, 341
Webb, M. F., 216, 289, 290
West London College, 251
Western Reserve University, 40, 104, 173
Weyman, A., *and* Davis, J., 'Computer-aided typesetting', 146–9
Whale, D., 3, 340; 'The industrial engineer', 41–4
'What computers will do', 358–63
White, E. V., 56
Whitehall, T., 'Time to think—use of the systems approach to the problems of the one-man information unit', 406–14
Whitrow, A. M., 290
Who's who in translating and interpreting, 253
Wiggins, E. D., 428
Williams, B. J. S., 74, 121; 'Microforms in information retrieval and communication systems', 223–31
Wilson, B. J., speaker, Aslib evening meeting, 349
Woledge, G., 'Copyright and library photocopying: the practical problems', 217–22
Wolfenden, Sir John, 38, 215
Wolff, H. S., 396
Wolk, L. J. van der, 75
Wood, R. G., 396
World Index of Scientific Translations, 254
World List of Scientific Periodicals, 22
World of learning, 75
Wright, G. H., 3, 215, 289; speaker, Scottish Branch, 1
Wright, N. F., 415
Wright, P. K. J., 5
Wright, R. C., 290
Wyatt, H. V., *and* Bottle, R. T., 'Training in the use of biological literature', 107–10; correspondence, 241, 318

Xerography, 220–1

Yarsby, V. E., speaker, Chemical Group, 2, 158; summary of paper by, 273–4
Yeats, J. C. R., 415

Zuckerman, Sir Solly, 430

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ASLIB PROCEEDINGS

incorporating Aslib Information

Volume 19 **January 1967** **Number 1**

ASLIB CALENDAR 1967

February

WED.1.	Engineering Group Conference at Aslib, 10.30 a.m.
TUE.7.	Film Libraries Group meeting at the Small Cinema, National Film Theatre, 6.45 p.m. 'Storage and preservation of films as records', by Harold Brown of the National Film Archive.
WED.8.	Joint meeting with the Institute of Information Scientists at Aslib, 5 for 5.30 p.m. 'Evaluation of large-scale information dissemination by AIDS', by R. D. Kerr-Waller.
TUE.14 – WED.15.	Course on work with patents at Aslib.
WED.15.	Scottish Branch Meeting, University of Strathclyde, Glasgow, 7.30 p.m. 'Some aspects of library co-operation', by G. H. Wright (Hatfield).

March

WED.8.	Chemical Group annual general meeting at Aslib.
TUES.14.	Evening meeting.
FRI.31.	Scottish Branch annual general meeting and conference, David Hume Tower, University of Edinburgh, 10 a.m.
FRI.31 – SUN.2.	Aeronautical Group annual conference, College of Aeronautics, Cranfield.

April

MON.3 – WED.5.	Repeat of Chemical Group course in Basic Chemistry for non-chemists. Shell Industrial Chemicals Laboratory, Egham. (See paragraph below.)
MON.10 – WED.12.	Further repeat of Chemical Group course in basic chemistry for non-chemists.
FRI.14 – SUN.16.	Transport Group conference at Leicester University.

May

MON.15 – WED.17.	Chemical Group conference at Attingham, near Shrewsbury.

June

FRI.16 – SUN.18.	Electronics Group annual conference, Ashridge House, Berkhamsted.

October

MON.9 – THU.12.	41st Annual Conference at Harrogate.

Chemical Group

Annual General Meeting

The Annual General Meeting of the Chemical Group will take place at 3 Belgrave Square on Wednesday 8th March.

Basic Chemistry for Non-Chemists

The first course held through the courtesy of Shell Research Ltd at their Egham Industrial Chemicals Laboratory was discussed at an informal sherry party on Tuesday 15th November. Mr Chubb of Shell was asked if it would be possible to repeat the course for those who had not been able to secure a place. A second course has now been arranged for Monday 3rd to Wednesday 5th April at Egham, and, as this too was overbooked, a third course (also overbooked) has been arranged for Monday 10th to Wednesday 12th April.

Expansion in the Chemical Industry

The conference at Attingham Park near Shrewsbury will now be held from Monday 15th to Wednesday 17th May, since Monday 29th May has been declared a Bank Holiday. The three main speakers will be Mr V. W. David (Development Director, Shell Research Ltd, Woodstock Agricultural Research Centre), Dr M. D. Fryers (Managing Director, Nicholas Laboratories Ltd, Aspro–Nicholas Group) and Dr V. E. Yarsley (Chairman and Managing Director, Yarsley Research Laboratories Ltd) who will describe the ways in which the agricultural chemicals, pharmaceuticals and plastics sectors of the chemical industry are expected to expand during the next few years.

After listening to the three main speakers, the delegates will divide into working parties to discuss and formulate recommendations as to how they can best handle the extra demands on their own service resulting from the expansion. A low-cost co-operative approach is one suggestion already received. The conference will be preceded by a tour of the Information Division of the Rubber & Plastics Research Association at Shawbury, Nr Shrewsbury, and delegates will then go to Attingham Park in time for the conference dinner on Monday 15th May. The guest speaker after dinner will be Sir George Trevelyan, Warden of Attingham Park.

The fee for the conference is $8\frac{1}{2}$ *gns* ($4\frac{1}{2}$ *gns* for non-residents).

Further inquiries should be addressed to the Secretary, Mr B. T. Stern, BIP Chemicals Ltd, Popes Lane, Oldbury, Birmingham.

Engineering Group Conference

The 1967 Engineering Group Conference will take place on Wednesday 1st February from 10 a.m. to 5.0 p.m. at Aslib. Lunch will be at the Anglo-Belgian Club.

The theme of the conference is 'Industrial classification and coding' and the speakers will be Mr S. A. B. Edwards of Manchester University, on Classification and coding; Mr L. Evison of Ferranti Ltd, on Classification and coding of materials, parts, tools and machines; Mr B. C. Vickery, Head of Aslib

Research Department, on Commodity classification in libraries; and Mr T. J. Grayson of Birmingham University, on Industrial classification in the Soviet Union.

The fee for the conference will be 4 *gns.* (3 *gns* to members of Aslib) Applications and inquiries should be addressed to Mr D. Whale, Tube Investments, Department of Technical Information, Rocky Lane, Aston, Birmingham 6.

Economics Group meeting

A meeting of the Economics Group will be held on Wednesday 15th February at 3 p.m., at the Project for a Survey Archive, which is at present working at Political and Economic Planning (PEP), 12 Upper Belgrave Street, London SW1.

The Project for a Survey Archive was set up to examine the possibility of creating a survey data bank. Its aim will be to bring into one frame of reference studies in a particular field from all sources including market research, public opinion polling, government social studies and academic studies. The purpose of the meeting is to learn something of the Survey's progress in compiling an inventory of surveys, and its proposed methodology.

Anyone, other than members of the Economics Group, who is interested in this meeting should get in touch with Miss D. Grose (Consumers' Association, 14 Buckingham Street, London WC2. Telephone: WHI 9921).

National Reprographic Centre for Documentation

The Office for Scientific and Technical Information (OSTI) has awarded a grant of £32,691 to the Hatfield College of Technology for the establishment and operation of a National Reprographic Centre for Documentation. The Director of the Centre will be Mr G. H. Wright, the County Technical Librarian. The functions of the Centre will be:

1 To act as a national clearing house for information on microrecording and associated reprographic techniques. All relevant published information will be collected, evaluated and abstracted and will be disseminated to interested users. The service will go out in microform and will in itself be used to assess the technical and economic parameters of, and users' response to, various microform systems.
2 To test and evaluate equipment on the British market and to co-ordinate this evaluation with similar work being undertaken by sponsored organizations in the USA and the Netherlands.
3 To examine and evaluate users' needs and encourage research and development to meet them.
4 To identify specific areas where further research and development is necessary and to sponsor and, where appropriate, carry out such work.

The activities of the Centre will be carried out by a small team with appropriate library, design and photographic experience and they will be guided by an advisory committee which will include representatives of Aslib, the Library Association, the Institute of Reprographic Technology, the Microfilm Association of Great Britain and the Office for Scientific and Technical Information.

MSc in Information Science at the City University

From September 1967 the present one-academic-year course in Information Science at the City University, London, will be replaced by a one-calendar-year course leading to the degree of Master of Science. The syllabus will be enhanced in certain respects, especially in regard to computer operation, and a dissertation on an information science subject will be required. Applicants for the course should have an honours degree in a science, engineering or other appropriate subject. The two-year, part-time evening courses, leading to the Certificate of the Institute of Information Scientists, will be continued as before. Further information can be obtained from the Department of Management Studies, The City University, St John Street, London EC1, or from the Institute of Information Scientists, 5/7 Russia Row, Cheapside, London EC2.

OSTI support for chemical information projects

The Office for Scientific and Technical Information has announced three grants to aid the development and experimental operation of chemical information services. These are:

(*a*) £17,500 over three years to the University of Sheffield for research on 'the automatic detection of structural similarities among chemical structures';

(*b*) £13,555 over three years to the University of Leeds for the formation of an information centre on 'the science and technology of high temperature processes'; and

(*c*) £6,000 over one year for partial support of the Chemical Society's Research Unit in Information Dissemination and Retrieval, located at the University of Nottingham.

The first grant is for a project, forming part of a British contribution to research in this field, to develop computer techniques for the correlation of chemical structures. The number of structures known to chemists today is about 3½ million.

The second grant is to initiate and develop a centre in which subject experts will select, assess and store, for dissemination to other research workers, information on high-temperature processes, an area currently of importance to chemical research.

The third grant provides the Chemical Society Unit with initial support for use evaluation studies, already announced, of US and British current-awareness tools including mechanized systems. These studies involve close co-operation with Chemical Abstracts Service and one of them, on the selective dissemination of chemical information, will form part of a large experiment which is being carried out by CAS with a number of users in the US. The work of this Unit should develop to play an important part in securing the effective use of mechanized information services in Britain.

Further details may be discussed with Dr. G. A. Somerfield, Office for Scientific and Technical Information, State House, High Holborn, London WC1.

The library market for scientific and technical publications

A conference on this subject is being held by the School of Librarianship, North-Western Polytechnic, London, with the aim of helping librarians and information officers, publishers, booksellers and periodical subscription agents to gain a better understanding of each other's work and problems, and to enable them to discuss matters connected with the publication and distribution of scientific and technical materials.

The speakers will be E. A. Austin, Head, Postal Subscriptions Service, William Dawson & Sons Ltd, on subscription agencies and the library market for scientific and technical periodicals; A. C. Bubb, Librarian, Royal College of Advanced Technology, Salford, on academic scientific and technical libraries and information services; Paul Edmonds, Director in Charge of Scientific and Technical Books, Macmillan & Co. Ltd, on scientific and technical book publishing and the library market; Claude Gill, Managing Director, Claude Gill Books, on scientific and technical bookselling and the library market; F. B. Roberts, editor of *Engineering*, on periodical publishing; John R. Stocks, Head of Central Information Services, Shell International Petroleum Co. Ltd, on scientific and technical libraries and information services for industry; and Frank R. Taylor, Scientific and Technical Librarian and Information Officer, Manchester Public Libraries, on public library scientific and technical services.

The conference chairmen will be Julian Blackwell, Director of Blackwell's, and Felix Liebesny, Intelligence Officer, British Aluminium Co. Ltd.

The conference will be held on Wednesday 1st March 1967, in the Lecture Hall, Holborn Central Library, London. The conference fee will be £2 2*s*. Prospectuses are available from P. K. J. Wright, School of Librarianship, North-Western Polytechnic, Prince of Wales Road, London NW5.

National Central Library

The fiftieth annual report of the Executive of the National Central Library reviews a notable year, ending 31st March 1966, which saw the move to new premises in Store Street and their formal opening by Her Majesty the Queen on Friday 18th March 1966, just fifty years after the National Central Library began its existence in March 1916. The report includes photographs of the opening ceremony and of the new building, a more detailed description of which is available as a separate publication.

Applications for loans rose by 7.4 per cent over the previous year to 128,567. Of these, 75.2 per cent of requests within the categories of material which the NCL undertakes to deal with were satisfactorily met, 18.9 per cent from the library's own stock. The sources from which satisfied applications came were: public libraries, 42.4 per cent; university libraries 27.5 per cent; special outlier libraries 13.9 per cent; government libraries 3.2 per cent; overseas libraries 5.7 per cent; others 7.3 per cent.

The year reviewed saw the publication of the first annual volume of the *British Union Catalogue of Periodicals* and also the first annual cumulation of scientific, medical and technological entries to produce the *World List of Scientific Periodicals, New Serial Titles*.

Manuscript collections

The latest (4th) volume of the *National Union Catalog of Manuscript Collections,* just published by the Library of Congress, describes 2,022 manuscript collections in 120 repositories in 48 of the 50 States. Together with earlier volumes, the catalog now covers 16,397 manuscript collections, reported since 1959 by 492 institutions in 48 States, the District of Columbia, and the Canal Zone.

Volume IV, *National Union Catalog of Manuscript Collections, 1965,* is sold at $15 a copy by the Card Division, Library of Congress, Building 159, Navy Yard Annex, Washington, DC 20541.

Martin Schuchmann

Oberingenieur Martin Schuchmann of the Deutscher Normenausschuss died in a Berlin hospital on 28th November 1966, aged 56. He will chiefly be remembered by Aslib members for his work as chairman of the Central Classification Committee of the FID and for his editorship of all German editions of the UDC.

Appointment

Mr David Grenfell has been appointed Chief Librarian of Radio Telefis Eireann, the Irish national radio and television organization. Mr Grenfell, who took up his appointment mid-December, was Aslib's first Information Officer and his *Periodicals and serials* is the third of the Aslib manuals. As Chief Cataloguer of the National Film Archive he was responsible for *Rules for use in the Cataloguing Department of the National Film Archive* and as Chairman of the Cataloguing Committee of the Aslib Film Libraries' Group brought into being Aslib's own *Film Cataloguing Rules.* He also assisted Unesco in drawing up a set of rules for international usage. Since 1963 Mr Grenfell has been Chief Film Librarian of Visnews, the international newsfilm organization, and has taken an active part in the organization of Aslib's courses on film librarianship.

MANAGEMENT: THE INTELLECTUAL CHALLENGE

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Senior Research Officer, Administrative Staff College

M. B. BRODIE
Director of Research, Administrative Staff College

Paper presented at the 40th Aslib Annual Conference, Wednesday 28th September 1966

Introduction

IN the past, the view taken of the job of management was essentially entrepreneurial. A man was in a position of responsibility and leadership because of natural endowment, not because of his formal education. It was a matter of personality, almost to the exclusion of other factors. Management was not a job for the intellectual and an undue exercise of the intellect in certain circumstances could be inimical to effective management. To the extent that the job might have been seen as requiring rationality, it was rationality at a mechanical level. The 'scientific management' movement expressed this very well. From this, it was only a short step to an anti-intellectual view, of which there are still exponents, not only amongst managers themselves, but even, ironically, amongst those in the training field.

There is talk now of a new professionalism in management, a contentious notion depending upon how professionalism is defined. However, one of the less contentious aspects is the demand that a manager be receptive to new ideas, new knowledge, new techniques, and that the needs and pressures of the job, now and in the future, require of him an intellectual curiosity and receptiveness such as his predecessors may never have shown or felt the need for.

The challenge is 'intellectual' not least because new knowledge is burgeoning on all sides and a manager may find his understanding improved, his problems solved better through help from seemingly unexpected quarters.

This challenge is intensified more for the manager than for many in other occupations, because he almost never faces an economic or a technical or a social problem in a narrowed-down form or in isolation. His problems are compound, with many possible combinations of elements. His interests are in problems and situations, which he cannot simplify beyond a certain point without sacrificing authenticity and reality. His behaviour would be naive if he underestimated the complexities and uncertainties, the possible conflicts of interests and views which fill his environment. Regrettably too, management situations are not designed to fall neatly into the academic compartments by which knowledge has been traditionally ordered. Nor is there any guarantee that the most significant factors will coincide with the areas of our best under-

standing—hence the development of a problem-centred approach and the search for an adequate framework of analysis. This development has taken until recently to strike its first roots in universities; traditional disciplines do not easily adjust to new needs and the onset of new disciplines.

Framework

The more traditional view of organizations was in terms of a formal, hierarchical pattern of relationships. Within recent years, as organizations have been studied from various angles—and their study interests many people looking at them from the outside as well as those inside—attempts have been made to refine this view. One knows that organizations designed within such a framework have limitations which are serious. As a framework, it does not incorporate enough understanding of what motivates people, nor is there enough consideration of how people react to one another and how they can organize themselves in ways which are unofficial and informal. Explanations of frictions between people and between functions are inadequate. Authority and communication relationships pose difficulties. The concept of the division of labour tends to be carried too far. When the needs for change and adaptation are present, acute problems arise. As for understanding what goes on in organizations, quite complex skills are in fact needed.

People with differing standpoints view the same situation differently. Consider a production line. A production engineer will see it as machines, operators and work flow. A personnel officer will see it as a set of human and man/machine situations and problems. The accountant will see it as assets and resources at work needing to be measured in money. The foreman will see it as a combination of men, machines, materials and targets. The manager, if inclined to a 'systems' view of life, will see it as a system involving many subsystems and flows of people, things and information, itself part of a wider system. It is the last which is the most instructive standpoint for the manager, because his responsibilities go beyond particular specialities, and he must see things in perspective and over time.

A general systems view of an organization is rather different from the older view. It recognises much more explicitly what the more traditional view either under-states or does not take into account at all. To quote a typical general systems view, an organisation is:

> 'A man-resource system; open, with various transactions between it and its environment; characterized by internal and external relations of conflict as well as co-operation; a system for developing and using power; a "feedback" system; changing; complex; loose; only partially knowable; subject to considerable uncertainty.'[1]

The social context of management

This is a view which is not just academic. It has been carried into the analysis and management of organizations. Wilfred Brown,[2] for example, has argued powerfully for the need to view an organization in terms of the social systems which make it up and to relate these to a thorough analysis of the work to be

done and the resources available to do it, and has applied these ideas. Likewise, Rice has taken as the focus of his studies the organization as a socio-technical system and the decisions and activities which are needed to get the organization into a proper relationship with its environment. Tom Burns took his investigations a stage further in treating an organization as an organism with problems of adaptation to a changing environment, by insisting upon the need for an 'organic' as against 'mechanistic' type of organization to cope with instability, to adapt to new and changing situations, to innovate effectively. Emphasis upon better decision making through more effective information flows, a greater clarification of conflicting goals and a need to reconcile them is typified by the thinking of Herbert Simon.

As for motivation and the behaviour of people, Elliot Jaques in this country, and Argyris and McGregor in the USA have advanced concepts and theories of people and of work which provide a closer understanding of organizational problems, and point to ways of designing organizations in the light of this.

The social sciences as a whole are now claiming increasing attention from managers, not only for their general interest, but also as a basis for action and application. Lupton[3] gives examples of how concepts which have developed from the work of social scientists can play a part in dealing with situations of conflict, whether this involves the resolution of genuine and healthy differences or less desirable factors which tend to reduce co-operation and sometimes lead to a breakdown in relationships. Likewise he illustrates their application to the problems of motivation and incentives, to consultation and participation and to those of change.

Difficult though it is to piece together these various strands, the conception of an organization as a social institution which has to cope with external uncertainties and internal conflicts and yet cohere provides a binding theme. The intellectual challenge is evident enough from the diverse sides of the social sciences from which ideas and the results of research work are coming. This requires of the alert manager that he learns from people who are working in a variety of disciplines, but it also implies that he is faced with the problem of selecting from the immense range of material available. It is partly to help managers to set out on this exploration that the Administrative Staff College sponsored certain of its publications.

The diagram below comes from one neat example of social analysis and measurement: (See Fig. 1).

In this instance, through quantitative analysis of the content of meetings and diagrammatic modelling of information flows, it became possible to reduce the number of meetings by 20 per cent and their duration by 30 per cent and to establish improved meeting procedures.

Another wider ranging application of behavioural science analysis, this time to a study of overloading in a university library, led to a set of policy propositions governing general policy and ways of meeting the stresses of increasing load and overload.[5] The effects of overloading on such varied factors as spatial organization, physical equipment, decision-making, morale and the status structure, all come into this study, illustrating the complexity as well as the richness of a problem centred approach.

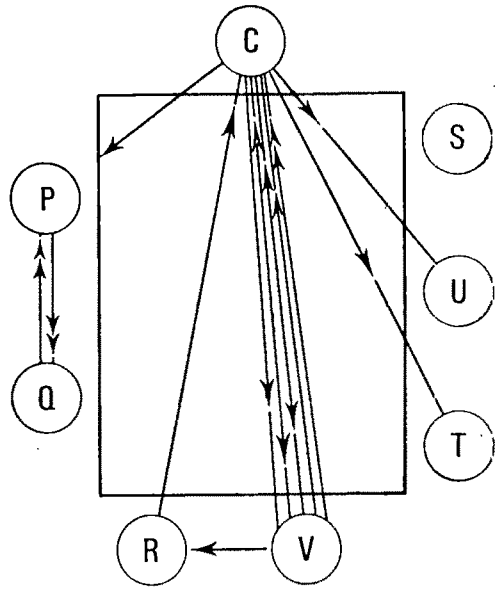


Fig. 1: Information flow diagram of meeting.

Source: Reference 4, page 55.

The analytical response

The need for an adequate framework of analysis was noted above (see page 8) and in the section that followed an assessment was given of the social systems view of organization as an expression of this framework. We now turn to the area where analysis has reduced situations to mathematical models which can be used:

to provide a precise but limited description of a situation or of a decision-making process,

to predict what would happen if a certain set of decisions were taken, and

to say what should be done to achieve a desired end result.

The last fifteen years have seen an accelerating rise in interest in this kind of work, which comes under the general heading of operational research. In 1949 the first number of the *Operational Research Quarterly* was published. Today there are over thirteen hundred members in the O R Society, and in 1965 the membership was increasing at the rate of 20 per cent per annum. In a related field, the first number of the *British Computer Society Journal* was published in 1957 and today's membership of that society, which stands at several thousands, is expected to almost double in the next two years at the current rate of increase. These increases also examplify the rate at which knowledge is developing—

something that we are, of course, all very well aware of. Although this conference is situated in hospitable Holland, we cannot learn from our hosts' dyke-making experience for controlling the flood of information. It is not sufficient to build a dyke of a certain height to channel the oceans of information. The volume is said to be increasing exponentially, as Price[6] has shown, and the scale and skill of controlling action must grow at the same rate.

Fortunately, the age is producing the tool (the computer) and, no less importantly, the skills to meet this challenge. These skills are often expressed in terms of models. Here the word 'model' is used to define a mathematical, statistical or logical description of a situation or a process of deciding the use of resources. A model has limitations. It is an abstraction of the true situation. Conclusions gained from it may or may not apply in the real world. Furthermore it will be inaccurate due to the estimates that have been used. Nonetheless, as long as the technique is applied professionally with appropriate caution it can be a most helpful tool.

From the sociological point of view, our point of departure is the behavioural model such as is developed by Cyert and March.[7] Such an approach studies the actual process of decision-making and, by reducing it to a sequence of logical and mathematical stages, sets out to replicate what takes place in a particular organization. Figure 2 from this book illustrates the structure of the decisions involved in running an investment trust, one of several situations studied. This may well have similarities with the work of information processing. This model, which is of recent origin and of a developing nature, is an attempt to reproduce the decisions that were taken in the management of the investment trust.

This work, while not exploring the feelings of the decision-makers, does set out to analyse the thinking processes they carry out. In contrast, cybernetics, 'the science of control and communication in the animal and the machine' (Wiener), is concerned with the messages that pass between elements in systems and not with understanding the processing that causes them. A cybernetic approach looks at the world from on top, whilst the behavioural model looks at it from within. Thus in cybernetics each part of the system is regarded as a 'black-box' with its own inputs and outputs. The aim is to describe what people do, or what a system does, i.e. their output in terms of the input or messages each receives. One example of this could be a description of the users of an information system in terms of the delays they cause to the journals that are circulated to them. If these delays vary from person to person and from journal to journal, it is a possible hypothesis that those who delay in passing on periodicals do so because they find them particularly interesting — or uninteresting—or because they already have a pile in their in-trays, or for some other reason. The important thing is that we are beginning to make full use of the information available to us to distinguish one user from another and one user's reaction to a particular periodical from another's. Any user's reactions are likely to change as time passes and a cybernetic model is likely to demonstrate corresponding adaptive or learning patterns.

Use of statistical techniques such as analysis of variance and regression analysis would then enable certain hypotheses to be tested and there is then the

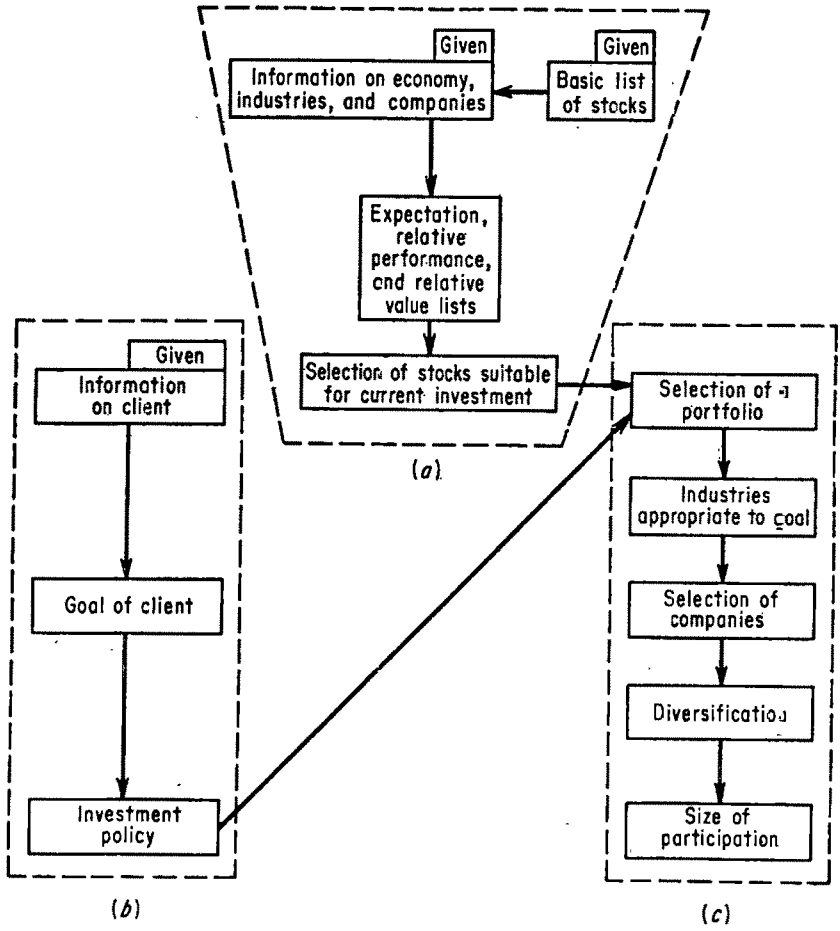


Fig. 2: Structure of trust investment process.

Source: Reference 7, page 257.

possibility that statements of the type, 'those who keep periodicals longest tend to be those who find them useful' or 'tend to be those who are unaware of the photocopying service' can be tested.

Another statistical technique that might be useful would be the theory of queues. This has several likely applications, whether it is in providing a satisfactory level of counter service or in predicting the circulation of periodicals between readers. Each in-tray holds a queue of periodicals waiting to be dealt with and then sent on. Using data similar to that gained from the cybernetic approach we can describe the time taken to do this. It will not be constant for any person, but will follow a distribution. Equally, other documents will arrive

in some form of pattern. With knowledge of a user's reading habits (perhaps he takes the next document from his tray, in which case it is 'last in, first out') we can then predict the movement of periodicals from him and hence round the system.

A further viewpoint for the study of information is to examine the communication system within an organization. This approach is described by Churchman[8] who related the flow of information to the flow of materials. Forrester[9] also constructed simple models and Figure 3 shows his model of the

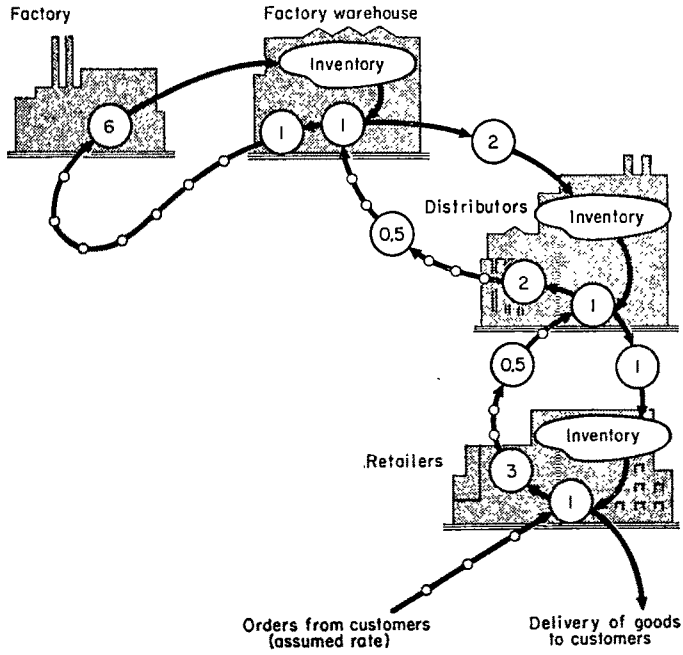


Fig. 3: Organisation of production-distribution system.

Source: Reference 9, Page 22.

Symbols: o-o-o→ orders ⟶ goods (1) time delays

organization of a production-distribution system. Models of this kind lead naturally to isolation of the decision processes and are preliminaries to either describing how the system will work or possibly to applying an electronic computer.

Turning to less formalised flows of information, we can ask how a certain development can be brought within the horizon of an organization. Several strategies are possible, such as by saturation, or by influencing a set of people who will then influence another set, who will then form a policy. These sorts of problems are beginning to get attention. For instance, marketing theory is concerned with influencing people, and models of information flow from person

to person exist, but this is still new ground. One aspect of marketing theory is to characterize consumers by their tendency to continue buying a particular brand and by their tendency to switch.[10] On the other hand the diffusion of information by personal communication between people in various cliques is also being studied.[11] Quite apart from the strategy, suppose the tactics are to ensure that each reader will see at least three periodicals with the information in. What is the cheapest way of doing this? Or, reversing the question, suppose the content of a set of periodicals can be described as giving a certain coverage of each subject, how can a set of periodicals be chosen at the least cost to give the desired coverage? Analysis of this type of problem can be useful.

This is a suitable context to mention redundancy, defined as receiving the same information several times, possibly from a variety of channels. Anyone who has worked as a manager and who is dependent on second-hand information, knows how a picture of events is gradually clarified by use of redundant information. Several colleagues confirm each other's accounts and the situation becomes clarified and a basis for action is established. Alternatively, anyone who has been consulted as a specialist by someone who is shopping around from one to another knows that his advice is more likely to be believed if other specialists are saying the same. In interesting contrast to this is the practice of computer programs to follow mathematical practice and operate on no redundant information whatsoever, although it is possible that this practice will become modified.

Besides knowing his customers, a supplier must also know his stock and his sources. For instance, Price[6] found that the number of times journals were consulted in a library during a particular year varied from approximately 500 to 1, with 3000 out of the 9000 periodicals not being consulted at all during the period of investigation. Knowledge of this kind by a librarian about his stock helps him, for example, in decisions about archives. However, before taking such decisions, he may wish to try out experimental placings of the periodicals, just as a chemical plant manager might vary the settings of his controlled variables and by measuring changes of performance over a series of experiments establish the best operating pattern.

As a final example of the flow of information through a system, we will turn again to Forrester.[9] Studying a distribution system of consumer goods from a manufacturer via wholesalers to retailers, Forrester showed that the decision-taking pattern led to a small variation in demand at the retail outlet being transformed to large swings in demand at the shop floor. He showed how the impact of such variations in demand on the system was amplified out of all proportion by the decision-taking practices governing the various elements in the system, until the factory was alternately on short time and on overtime. This illustrates how delays in the passage of information affect decisions and can multiply difficulties, and suggests how managers can avoid difficulties by arranging to get early information. It is an interesting possible implication of today's improvements in communications systems that the delays which are one of the causes of the amplifications that Forrester's work explains may become rather less.

Turning now to the predictive aspects of modelling, we are concerned with

forecasting effects of various policies, and thereby selecting the one that best meets our requirements. In doing this, use will often be made of models of situations that already exist, and the types of decisions that may be taken include both operating and one-off decisions. The final stage of model building is to model a complete control system. A very simple example of this would be to install a thermostatically controlled water heater and then to predict how the temperature of the water will vary for changing loads, the important point here being that the whole system is being studied.

Similarly, the provider of information and his client are interacting. As each learns more about the other, the system works with growing effectiveness and economy, with the user's needs being met in increasingly efficient ways.

One aspect of this is the development of a measure or measures of performance, so that we can discriminate between systems and see which is preferable. This is no easy task. Naive measures might include the number of references to circulated work in the reports written by the users. More sophisticated measures, though these would vary from enterprise to enterprise, would be to relate the performances of the information service to that of research and development. If the service is good, then the R and D effectiveness will improve.

Measuring effectiveness of R and D is a difficult task, but a proposal by Marples[12] suggests one way round. In what he calls 'a solution development record', individual members of a research team working on a problem give their opinions of the likelihood of any particular line of approach, from amongst those under consideration, being the one ultimately used. This opinion is then repeated and revised at intervals, in terms of the probability of eventual adoption. Examples of the general type graphs that result are shown in Figure 4.

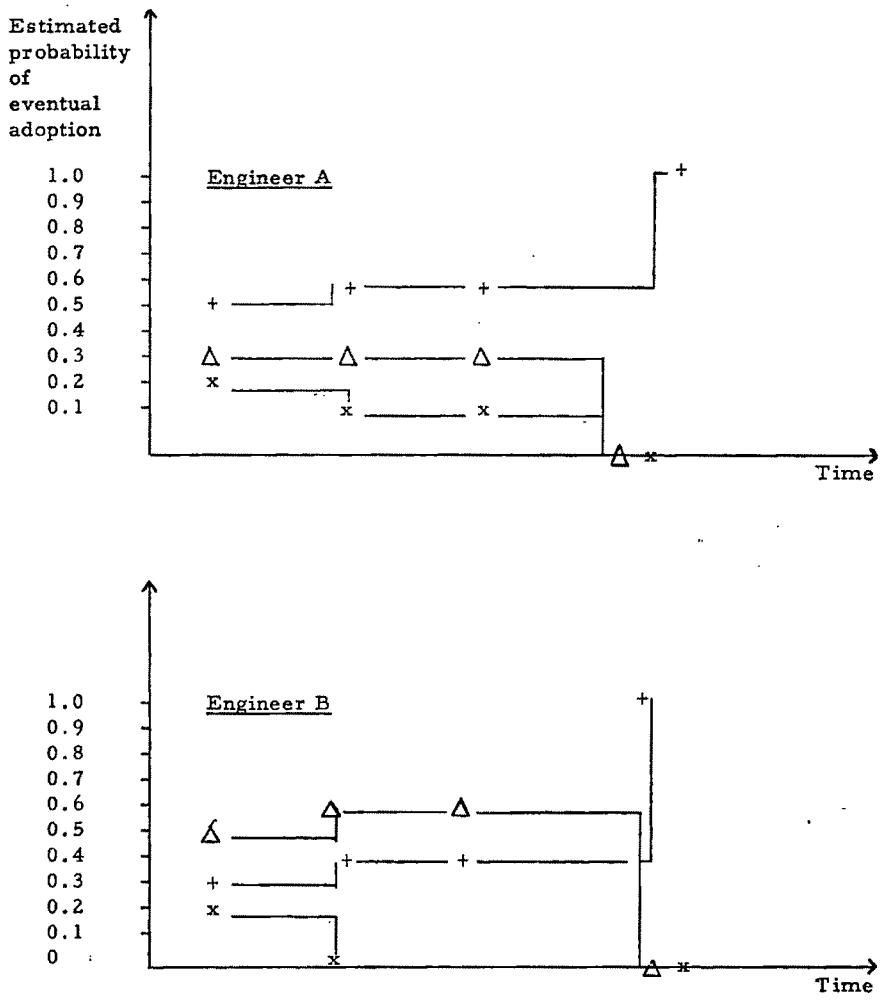
A change in the probability assigned to any solution is due either to the receipt of new information or to further thought about the problem. The former can provide interesting data and suggests that the initial questions an information scientist might ask a user are: What is your problem? What, at the moment, do you consider to be the several possible solutions? What probability do you assign to each, of its being the solution that is ultimately adopted? By repeating the last question on subsequent encounters and following up with supplementaries when the reply changes, it would be possible to determine when significant new information had reached the inquirer.

If this sort of information were available to the information provider he would be getting feed-back of a very satisfactory nature. The loop between him and his users would be closed and this would further facilitate the introduction of more improvements into the system.

It is this concept of feed-back which closes the loop between a person, the model which is his framework, and his environment, and is a central feature of successful systems design. By making the greatest use of the information received from the environment, the decision taker is able to:

a know what the position is for his next decision,
b bring up to date his estimates of the parameters,
c pick up any exceptions that fall outside the expected pattern.

This is essential information for any manager.



KEY: + An engineer's estimate at any instant of
Δ the probability of the successful adoption
x of each of three possible solutions.

Fig. 4: Solution Development Records
Source: Reference 12

To conclude, the last decade has seen the application of mathematics to business operations of all types. The work done in industry has several times led the universities, and the effects have been felt down to the curriculum of schools. The next decade will witness new skills of management and new types of managers, who will be making new demands on information services and those who manage them.

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We are also grateful to Mrs H. J. Elphick of Aslib, and to Mr J. W. Marshall and Mr C. E. Rogers for helpful preparatory discussions.

REFERENCES

1 Adapted from B. M. GROSS. What are your organization's objectives? *Human Relations*, August 1965, page 197.
2 D. S. PUGH, D. J. HICKSON *and* C. R. HININGS. Writers on organizations. Hutchinson, 1964. (Includes appropriate references to those mentioned here and in the next paragraphs.)
3 T. LUPTON. Management and the social sciences, Hutchinson, 1966.
4 J. D. CROSTON *and* H. B. GOULDING. The effectiveness of communication at meetings: a case study. *O. R. Quarterly*, vol. 17, no. 1, March 1966.
5 R. L. MEIER. Communications overload: proposals from the study of a university library. *Administrative Science Quarterly*, March 1963.
6 DEREK J. DE SOLLA PRICE. Little science, big science. Columbia 1963 (paperback).
7 RICHARD M. CYERT *and* JAMES G. MARCH. A behavioural theory of the firm, Prentice-Hall, 1963.
8 C. WEST CHURCHMAN, RUSSEL L. ACKOFF *and* E. LEONARD ARNOFF. Introduction to operations research, John Wiley, 1957.
9 J. FORRESTER. Industrial dynamics, John Wiley, 1961.
10 KUEHN *and* DAY. Probabilistic models of consumer buying behaviour. *Journal of Marketing*, vol. 28, 1964.
11 DODD *and* MCCURTAIN. The logistic diffusion of information through randomly overlapped cliques. *Operational Research Quarterly*, vol. 16, no. 1, March 1965. pp. 51–63.
12 D. L. MARPLES (Department of Engineering, Cambridge University). The management of design work—a proposal for research. 1965. (In a private communication.)

DISCUSSION

Dr Miles Martin (University of Pennsylvania) said that the intellectual challenge to management was that staff were becoming more technical and managers found it hard to understand their ideas, while the managers themselves had a wider frame of reference, which was not understood by the technical staff. Management needed to be able to present its objectives so as to guide technical staff to deal with the right problems, and to understand enough about techniques to communicate with technical staff. How, in analysing the effect of new information on behaviour, should we distinguish between the effect of new information and the effect of new thinking about old information, and how could we pinpoint those items of information which have caused behaviour change?

Mr Brodie replied that the need for managers to understand new techniques was also a challenge to the specialist, who had to learn to explain his technique in simple terms. Educators too should improve their presentation of technical principles. The specialist should help

management to identify its real objectives, including the need to take into account 'political' factors.

Mr Aston added that techniques were still being developed for analysing the effect of information on behaviour, and studies by information workers would be helpful.

Miss J. E. Cloke (Bexley Public Libraries) said that she and her colleagues had tried to learn management techniques by attending likely meetings and by examining other organizations, and had then used these techniques in library development. It was not necessary to be an expert, but one must have enough knowledge to make preliminary proposals for experts to develop, and to evaluate their comments. Many management theories were only systematized commonsense, and there need be no conflict between the two. One central problem was to decide the objectives. How could one objectively assess the quality of a library service?

Mrs I. Veasey (Blackwells) asked whether management theory should be introduced as part of general education.

Mr Aston replied that measurement of service might be aided by the techniques of 'management by objectives'. Teaching of management techniques, he said, had been introduced at increasingly lower educational levels, even into schools.

Mr J. R. Stocks (Shell) said that engineers could replace outmoded machines, but managers could not so readily make staff changes. To what extent should rational decisions about staff changes be tempered by humane feelings?

Mr Brodie replied that theoretical techniques of management could only be evaluated by trying to use them in practice. Theory systematized commonsense into standard techniques that could be taught and applied. It was for the librarian to suggest the criteria of efficiency of service, not the specialist. Management must include human considerations as one component in a rational decision. All decisions would affect people, and our choice of a decision would have to take this into account.

Mr R. Snel (Shell International) said that information workers often complained that management did not understand them. They would improve this situation if they themselves studied management problems.

ASLIB PAST AND FUTURE

R. S. HUTTON, M.A., D.Sc.
Goldsmiths Emeritus Professor of Metallurgy
at the University of Cambridge and founder member of Aslib

Evening Meeting, London, Wednesday 30th November 1966,
to mark the speaker's 90th Birthday

THE meeting took the form of an interview in which Professor Hutton answered questions put to him by a panel consisting of Miss M. Gosset, M.B.E., B.Sc., A.R.C.S., formerly Librarian, AERE, Harwell; Mr B. Fullman, M.B.E., B.Sc., F.R.I.C., F.I.M., formerly Information Officer, BNFMRA; and Mr Leslie Wilson, M.A., Director of Aslib.

The Director opened the meeting by inviting the audience, amongst whom were at least two founder members who had been present at the first Aslib Conference in 1924, honorary members, including the former Director, Miss E. M. R. Ditmas, as well as many new members, to show by a round of applause their appreciation of Professor Hutton's presence and of his past and continuing interest in Aslib. The response was spontaneous and enthusiastic.

The Director put the first question to Professor Hutton.

We realize that you have from your early life been interested in libraries. Can you say how this started and how it developed?

I feel very honoured to have been asked to give you recollections of my early life and how my interest in searching for information lead to the start of Aslib in 1924. In view of this invitation I may perhaps be excused for 'blowing my own trumpet', although at the back of my mind I realize that most of the activities on which I have been engaged have depended for their success on other members of the orchestra. I want to make clear to younger members of Aslib that I cannot claim to be either a librarian or an information officer myself. Despite this I have a passionate interest in libraries.

I owe a great deal to the public libraries' service for, as a lonely science student in Manchester from 1894 onward, I spent much of my spare time at week-ends in visiting the Reference Library where, through the open-shelf reference section, I first started to be really interested in books.

Then, as a research student in Leipzig I was persuaded by the staff to follow up their practice of delving more and more deeply into the periodical literature covering the subject of my studies. There, and again in Paris where I continued my research student life, I started to make a large collection of books and reprints covering a wide field of physics and chemistry.

On returning to Manchester University in 1900 I was appointed a Lecturer

in Electro-Chemistry and Electro-Metallurgy at a stipend of £100 per annum increasing to a maximum of £250 per annum in 1908 (after 8 years' teaching and fifteen years' academic work) by which time my private resources were exhausted. Unfortunately there were no subsidies for a secretary or for the purchase of the literature, British and foreign, required for my new field of work. Neither the University nor the public libraries provided the periodicals I required. (Even in 1907 the Manchester Reference Library only had 86 scientific and technical journals; today it has 1,286.) I had to buy these books and periodicals myself, or, as frequently was the case, travel to London to the Patent Office Library.

In 1907, with the help of the *Manchester Guardian*[1], the Chamber of Commerce, and the (Industrial) Chemical Club, I started a movement to persuade the Manchester Corporation to visit America, as I had done myself in 1902, to inspect some of the good libraries available to industry there. The Corporation sent a deputation which published an illustrated report[2] and ultimately a Scientific and Technical Library was opened on the Piccadilly site in Manchester in 1922, and was later on embodied in the fine Municipal Library there opened in 1934.

My continued interest in libraries is shown by my membership of the Library Committees of the Manchester Literary and Philosophical Society, the National Central Library, and the Universities of Manchester, Cambridge and London; also, more recently, of the new National Reference Library of Science and Invention.

During my first visit to the USA in 1902 and on my five or six subsequent visits, I spent a lot of time in visiting American libraries and studying their information services and I am still impressed with the apparently much greater library-mindedness of the public there compared with this country.

Can you tell us something about the beginnings of Aslib, the leading figures involved, the factors and events leading to the 1924 *conference at which it was founded?* (Miss Gosset.)

I have dealt at some length with this matter in my paper on the 'Origin and History of Aslib', published in 1945.[3]

As a member of the Council of the Institute of Metals from 1908 for 27 years, with its Publications Committee I had taken an active part with the editor, Lt.-Col. S. C. Guillan, in improving the abstracts section of its journal.

The British Non-Ferrous Metals Research Association of which I was Director, shortly after its foundation in 1920, realized that whilst our main function was to foster experimental investigations, it was equally important for the progress of our industry to collect information from world-wide sources. To carry out this work we appointed a young librarian, A. F. Ridley.

The importance to industry of the time factor for such new information is very great. Consequently when the *Bulletin* of the BNFMRA started in about 1921 it provided more prompt but more condensed references than the Institute of Metals to a wide range of the world's metallurgical papers and this was greatly extended with the help of B. Fullman, for many years its renowned Information Officer.

Although many others were becoming aware of the importance of improved scientific library resources and the foundation of information bureaux connected therewith, the calling of the first Aslib Conference may claim to be the first effort to broadcast these needs.

At that time week-end conferences were getting quite popular and Ridley suggested to J. G. Pearce and myself that we might run one of these ourselves. The first conference was an outstanding success for, after a number of sessions which started on the Friday night and went on almost continuously on the Saturday and Sunday during waking hours, we proved our worth by receiving the commendation of the Secretary of the Carnegie Trustees and, shortly afterwards, their financial support for a few years.

Of the founder members I remember clearly the keen interest shown by Sir Hugh Beaver (subsequently President of the Federation of British Industries), Sir Robert Hadfield, Bt., the steel magnate; Sir Arthur Fleming and J. G. Pearce, of Metropolitan Vickers; W. Barbour of Nobel Explosives; and Mr Vincent Garrett of Rowntree & Co, York.

I would like to emphasize the very important work carried out by the late Dr S. C. Bradford (Keeper of the Science Library), both inside and outside Aslib. By persistent effort he was able greatly to increase the resources of his library, being fully backed up by Sir Henry Lyons, then Director of the Science Museum.

He also made important studies of the scatter of published scientific and technical papers, with the help of the late E. Lancaster-Jones.[4] The conclusions he drew prove that no individual company, or even institution, could possible know of the existence of important papers even by acquiring for their own libraries the journals which specialized in the field with which they were principally concerned. Thirdly, he exposed the danger of depending on abstracts journals, and fourthly, with his experience of dealing with a large collection of publications and an immense collection of reference cards from Belgium, Dr Bradford became a staunch supporter of the Universal Decimal Classification.

Another important investigation of abstracts journals was carried out by Aslib in 1932 when Sir Henry Tizard was President. He persuaded A. A. Eldridge to undertake this and the report clearly shows how inadequate was the coverage of foreign journals.[5]

What was the nature and extent of Aslib's influence in, say, its first ten years, in the development of library and information services in industry? How was this exerted—through publications, or conferences, or by representations to Ministers or by some other methods? (B. Fullman.)

As can be gathered from the list of the companies represented at the first Aslib Conference in 1924, the number of industrial concerns actively provided with library and information services was probably very limited.

The early Aslib meeting no doubt stimulated many other companies to start, in a more or less modest way, information departments of their own. I remember distinctly the Mond Nickel Company (International Nickel) starting their Research and Development Department in 1927, and the *Nickel Bulletin* in

P15797

1928, with Miss E. W. Parker, whom they had secured from the Research Department, Woolwich, being an outstanding collector of information.

The extension of information bureaux in business concerns was no doubt aided by the intercourse between members at Aslib Conferences and by such special representations to library committees as was the case for instance in Sheffield which lead to the 'Sheffield Experiment' of inter-company lending.[6] The progress since then has been rapid and encouraging as is well illustrated by the growth of membership of Aslib.

Another example of Aslib's influence in improving the supply of business and other information in this country is the part it played in the establishment of the American Library in Grosvenor Square. Archibald McLeish, when Librarian of Congress, attended a Council tea-party of Aslib and we proposed to him the improvement of the supply in this country of American Government publications, corresponding to the old established British Library of Information in New York. This was ultimately secured through HMSO.

In 1925 Aslib gave evidence to the Parliamentary Committee on Public Libraries, in which the Carnegie Trust was interested.

In view of the limited resources of individual libraries anyone depending on a broad review of publications naturally looks to union lists or other reference books surveying the contents of libraries, either nationally or regionally. Already at its first meeting Aslib had before it a proposal to publish a Directory of sources of Specialized Information,[7] the original plan of which was put forward by A. F. Ridley.

Long before this some local union lists of periodicals had been published. The first with which I had any direct contact was the one by Charles W. E. Leigh for Manchester. Then in 1927 R. A. Rye, the London University Librarian, published 'The Student's Guide to the Libraries of London'. Ridley's scheme was far wider so as to include all the libraries of the British Isles and to provide classified particulars of their holdings.

Fortunately the Carnegie Trustees realized the importance of such a Directory and ultimately provided for the full cost of editing, printing, and publishing it in 1928. E. W. Hulme, late Librarian for the Patent Office, was the active Chairman of an Aslib Committee in charge of the work and Mr G. F. Barwick, who had just retired from the British Museum Library, with the assistance of Miss E. S. Durrad and Miss M. G. Warren, carried through the editorial work.

The publication of the first edition of the *World List of Scientific Periodicals* in 1925, which preceded the *Aslib Directory*, dealt with individual titles and was quite different in character. Dr P. Chalmers Mitchell, of the Zoological Society, was the leader of this work which came under the Conjoint Board of Scientific Societies. His original idea was to include only the five copyright libraries. As I have reported elsewhere, I realized that this would not be of much service to a large industrial centre such as Manchester. With the help of Sir Richard Gregory, the Carnegie Trustees were persuaded to provide financial aid, conditional on the inclusion of all libraries willing to provide data on their own holdings with the result that the first edition contained 150 libraries.

The splendid example of the publication of the several editions of the *World List of Scientific Periodicals* encouraged Aslib, originally at the suggestion of

T. Besterman, to edit and publish an even more comprehensive *British Union Catalogue of Periodicals*. This covered the holdings of 453 libraries. Like the *World List*, it was generously supported by the staff of the British Museum and, as representative of Aslib, I served on the Committee which undertook this task, of which Mr J. D. Stewart was editor, and I was able to introduce them to Messrs Butterworths as publishers.

Miss Ditmas was appointed Secretary of Aslib in 1933, at a period when it was unusual for a woman to hold such a post. How did it come about that a woman was appointed? (Miss Gosset.)

This loaded question of Miss Gosset's is surely quite unjustified. If you look at the group photographs of the early Aslib conferences you will see that there is no sex discrimination. Even before Miss Ditmas, Miss Warren deputized for Mr Bullock, one of the early Secretaries, and before that she and Miss Durrad were dealing with the *Aslib Directory*.

I cannot claim any personal influence in selecting a woman for the Secretaryship, although both my wife and I were closely linked with the early suffrage movement and Christabel Pankhurst was a student at Manchester University while I was on the staff there.

Aslib owes a great deal to the splendid work done by its successive Secretaries and Directors, in particular to the unselfish devotion of Miss Ditmas from June 1933 to February 1950, and then as Editor until 1962. A great part of this time covered the period when we had no financial support from outside and our resources were often at a very low ebb. In fact I seem to remember that on some occasions Miss Ditmas had to finance the Association rather than the reverse.

Government financial support, which has been an important factor in the growth of Aslib, started during the war, largely because of the usefulness to Britain and her American allies of the Aslib Microfilm Service. Can you tell us how it came to be set up and what it achieved? (Leslie Wilson.)

Aslib's interest in microfilm reproduction of printed matter may be said to date from the 1937 Conference when I myself, after a visit in the previous year to the USA, read a paper[8] and we had an exhibition of apparatus. I had brought back a microfilm-reader from the USA which ultimately was installed in the Cambridge University Library. When the 1939 war started, Eugene B. Power, of University Microfilms of Ann Arbor, Michigan, USA, was carrying out a project in Europe to reproduce for American libraries some of the more rare books available over here. In this connection Mrs Lucia Moholy was working in the Cambridge University Library. I approached Eugene B. Power and impressed on him that a much more worthwhile war-time task would be to use all his cameras to photograph information from enemy country sources which might reach this country. This, I think, was the origin of the Aslib War-time Microfilm Project which received the active support of the Royal Society and of the British and American Governments. It was operated by a staff under Mrs Moholy and a Committee successively under E. J. Carter and the late Professor C. H. Desch, and the contents of some 260 journals were photomicrographed, and in addition a lot of miscellaneous documents.

This important national service, which also greatly benefited the USA, drew the attention of the outside world, and particularly the Government, to the activities of Aslib. However, it was only in 1944 that the DSIR started to give direct financial support to Aslib.

What do you consider to be the most important need at the present time for improving our scientific and technological information services? (B. Fullman.)

The foundation on which the improvement of scientific and technical information services can be based surely depends on a more extensive collection than exists in this country at present of world-wide periodical and other literature in the whole of its range. The quantity of this literature is so vast that it is obvious one cannot depend on the libraries of individual scientific and technical institutions and the requirements can only be met by the rapid development of national libraries.

As long ago as 1918 the Royal Society with the Conjoint Board of Scientific Societies demanded a central indexing organization provided with a comprehensive collection of the world's literature, and in 1933 the Royal Society, replying to a Treasury Economic Advisory Council inquiry, made similar demands emphasizing their importance to technical industry and industrial research.

I myself first drew attention to this by submitting critical memoranda on the Patent Office and Science Museum Libraries to Sir Henry Tizard for the Committee on Industrial Productivity in 1948, which were passed on to the National Advisory Council on Scientific Policy when this Committee was dissolved. In 1951 the Advisory Council on Scientific Policy recommended a great extension of the Patent Office Library to form a National Reference Library of Science and Invention.[9, 10] Originally it was hoped that the new library building would be erected and opened in 1965, but I understand that the foundation stone has not yet been laid.

The National Lending Library for Science and Technology was another proposal of the Advisory Council on Scientific Policy and this was opened in 1962 at Boston Spa on the Yorkshire moors.

The target for both these libraries must run into very high figures. Some suggest as much as 60 to 70,000 periodicals. Already the National Lending Library claims to have over 24,000 journals and the National Reference Library of Science and Invention about the same number.

It is obviously of high importance that this wide difference should be bridged or explained away for one ought to look to these National Libraries as a comprehensive source of information. The Library of Congress is said to have made a record which showed that at the time about 1,000 new periodicals were appearing each month and I myself suggested to the Royal Society Empire Scientific Conference in 1946 that records should be available of the birth of new periodicals and the disappearance of others.

One important consideration that all Information Departments need to bear in mind is the wide scatter of published matter dealing with their individual subjects. Reference has already been made to the work of Dr Bradford who inquired into this matter. It is not only that often in the most unexpected journal important matter is to be found. The contents of many libraries is

limited to the highest class books and periodicals, but a national collection such as we have in view should contain a comprehensive collection of the literature of its field, however inferior its quality may at first sight appear. It is through such a national library that industry itself can be made aware of the existence of trade information vital to its progress.

It would be possible to give examples of new industries which have arisen from someone coming across their possibilities by getting the suggestion from some technical journal. On the other hand one could cite obvious opportunities which had been missed for lack of spotting such information. Of the former I might quote my own experience with others on the staff of the BNFMRA which resulted in a valuable contribution to the successful operation of the Royal Fleet during the Second World War. In all steam plant, both land and marine, which uses tube condensers, the frequent breakdown by corrosion of the brass tubes has been an age-long source of trouble. When we invented the new brass alloy containing aluminium the result was an almost complete solution of the problem. However, the addition of aluminium to brass was strongly objected to as all earlier experience found it most deleterious. Fortunately in the trade literature and later amongst the patents, we found that a new French process of casting copper alloys containing aluminium overcame the difficulties and by adopting this Durville process of aluminium brass, production was safely launched.

What further steps are required for bringing scientific and technical information more fully to the service of industry? (Miss Gosset.)

Following the establishment of first-class lending and reference libraries, several big tasks require attention; briefly one can define these as:

1. Foundation of a fully comprehensive indexing and/or abstracting organization which will utilize the improved library resources.

There must be today at least two million worthwhile articles published each year in the world's periodical literature referred to above (Russia suggests $4\frac{1}{2}$ million per annum, rapidly increasing), and probably less than half of these are dealt with in the recognized abstract journals. In most subjects abstracts are far less complete than those in *Chemical Abstracts*.

What is required is a large-scale national organization to prepare centrally classified indexes or abstracts of the whole of this literature. The classification of this material, often requiring duplicate entries, is obviously a task demanding a wide range of skills both from the language and subject expertise points of view, bearing in mind the enormous scale of the operation and the importance of the time factor in assuring prompt service. With the aid of computers it should be relatively easy to pass on any particular section of the classified index for the preparation and publication of abstracts, either by existing institutions or on a national basis.

In fact this is already being done in Russia[11] where a number of very large libraries have been established in Moscow, Leningrad and even in Siberia, and, utilizing these, the VINITI information service has been established in order to ensure that the prompt attention of industry is drawn to new work of special importance.

Dr Kaftanov of the Moscow Chemical Technology Institute stated at the British Association Meeting in September 1966 that seventy series of weekly 'express information bulletins' were published in Russia. He estimated that 4½ million documents on science and technology were issued annually and he claimed that VINITI was the largest information centre in the world. It should be noted that all this Russian activity has industrial development, and not merely academic study, as its main objective.

Obviously the building up of a comprehensive indexing, abstracting, and distribution system demands large-scale staffing and financial support far beyond anything so far envisaged in this country for the libraries themselves. (VINITI is said to employ 2,500 full-time staff and 22,000 part-time specialist abstractors.)

Some of those who recognize the enormity of the task of collecting information from world-wide sources in indexed or abstracted form have thought that this might best be done by international co-operation, but the sad experience of the Royal Society with the 'International Catalogue of Scientific Literature' early in the century has shown how these projects can fail owing to the difficulty of synchronizing such international efforts.

2. Based on a national establishment for indexing, well-organized information departments are required by the specialized institutions or business concerns to provide information of potential value to them.

In providing such information services we have still a long way to go before we achieve the proposals put forward by Francis Bacon in his New Atlantis, 'Solomon's House' some 350 years ago. It is said that the Royal Society was based on his proposals, but a detailed examination of them indicates that eight classes of staff were proposed, starting with a number of individuals, sent to foreign countries to report on anything new observed in their activities and their work, to research workers, librarians, information officers, and finally 'Dowry Men' (Development and Forecasting Officers) who would see that the information collected from abroad or from the organizations on research work was adequately brought home to those who could use it.

This problem of applying new knowledge and forecasting the future requires a new class of super-Information Officers, who should hold positions of the highest rank and be endowed with outstanding imagination. Their task should be to bring home to the appropriate individuals (Directors, Researchers, etc.) the really important information collected through the other members of the staff. In the larger concerns, it might call for almost a superman as Development Forecaster, but even in the small concerns the scope and efficiency of every Information Officer demands new emphasis and particularly the consideration of the diverse requirements and varied receptivities of members of the senior staff for whom he operates.

One most important consideration in operating the distribution of information to individuals is to develop a technique which will limit the report (oral or written) to the clearest and shortest possible form. This affects not only the technique of the Information Officer but is of direct importance in enabling those to whom the information is given to keep their time and minds clear from the task of searching for it themselves. (The USA Special Libraries Association a few years ago defined the information required by a business

executive as 'not a clearing house, but one single thought, boiled to the bone and available instantly'.)

I have dealt at some length with the matter in a paper to Aslib in 1946.[12]

How would you like to see Aslib develop in the future and in what directions should its influence be turned? (Leslie Wilson.)

I hesitate to reply to this question for I cannot claim to be fully up to date in all that Aslib is doing. Moreover, like all of us I have great respect and admiration for the work which Leslie Wilson has done for Aslib since he became Director in 1950. No doubt many extensions of our work are held up by limited financial support from the Government or from other sources.

Aslib increases its membership largely by the influence of old members on new ones. I wonder whether some more systematic approach might be organized along the lines of the best public relations officer system. It is not only increased financial support we need, but perhaps even more important is to make known in the most influential quarters what Aslib is doing and what it wants to do.

This could perhaps be extended by keeping alive correspondence in the Press initiated by ourselves and others or, for instance, finding opportunities through the BBC Talks Department or in their programme 'Listening Post'.

For the adoption of the results of our work it ought to be made known to wider circles such as trusts and foundations and to the individual members of the Council of the Confederation of British Industries and of appropriate Government Departments; individual fields such as the Social Sciences, Business Consultants, etc., also offer opportunities.

The first important objective is to awaken the country, through these bodies, to the urgent need for completing the National Reference Library of Science and Invention and to realize its potential importance to our industrial survival.

There is another suggestion I would like to revive; some years ago I put forward the proposal that Aslib should publish a Business Information Guide—Aslib BIG Book—to supplement existing desk reference books, rather on the lines of a very small Whitaker's Almanack, but containing data not readily available elsewhere.

My third suggestion is a quite different one, but Aslib has also dealt with it on other occasions. At the Seventh Aslib Conference in 1930 resolutions were passed instructing the Council that 'recognizing the vital need for training students in the efficient use of libraries they should urge university and other education authorities to consider the organization of systematic instruction in the use of libraries, and that for instance the librarians should give an annual lecture to all new students . . .'.[13]

The Director closed the meeting by warmly thanking Professor Hutton, Mrs Hutton, their son David, and his wife, and all others connected with Aslib since its early days, for coming to the small tea party which had immediately preceded the meeting. He made special mention of Mr Carter, Col. Guillan, Miss Ditmas, and Miss Mildred Couldrey (formerly with ICI Head Office Library) also Miss E. W. Parker (formerly with the Mond Nickel Co) who had been prevented only at the last minute from joining them.

The audience expressed their thanks to Professor Hutton and the members of the panel with sustained applause.

REFERENCES

1 Leading article, *Manchester Guardian* 28 September 1907 and subsequent correspondence.
2 Manchester Libraries Committee, *Special Report,* 1908.
3 The origin and history of Aslib, R. S. Hutton, *Journal of Documentation,* vol. 1, no. 1, June, 1945, p. 6–20.
4 BRADFORD, S. C. Documentation, London, 1948; also Complete Documentation in Science and Technology, XVIth Conference, Institut de Documentation, 1946.
5 ELDRIDGE, A. A. Scientific and Technical Abstracting: A Report on the Aslib Enquiry, Aslib 9th Conference Report, 1932. Report of Proceedings of the 9th Conference, 1932, p. 83–90.
6 LAMB, J. P. *The Sheffield Experiment—How it is Succeeding.* Aslib report of Proceedings of the 12th conference, 1935, p. 97–102.
7 Aslib Directory: a guide to sources of information in Great Britain and Ireland, 2 vols. Aslib, London, 1928, 2nd ed. 1957. Supplement 1961.
8 HUTTON, R. S. *Micro-photographic Processes in Documentation,* introduction to the session. Aslib report of proceedings of the 14th conference, 1937, p. 96–9.
9 Advisory Council on Scientific Policy, Fourth Annual Report 1951–52.
10 National Reference Library of Science and Invention. A symposium with contributions by: R. S. Hutton, Maysie Webb, E. M. Nicholson and A. H. Chaplin.
11 DSIR. Scientific and technical information in the Soviet Union: report of the DSIR-Aslib delegation to Moscow and Leningrad, 7th–24th June 1963. [London], the Department, 1964. iv, 44 p.
See also Dr S. Kaftanov, British Ass. *Times,* 2 September, 1966.
12 HUTTON, R. S. The Communication of Specialist Information to Business Executives, ASLIB Report of the Proceedings of the 21st conference, 1946, p. 57–65.
13 HURST, P. Teaching the Use of Libraries: Aslib Report of Proceedings of 13th conference, 1936, p. 24–8.
HUTTON, R. S. Training Students in the Use of Libraries. *Universities Quarterly,* vol. 4, no. 4, August 1950.
HUTTON, R. S. Sources of Scientific Information. *Journal Inst. C.E.* vol. 17 (1941–42).

Letter to the Editor

RELEVANCE ASSESSMENT

Dear Sir,

In replying to my earlier letter,[1] Mr Rees appears to have shifted his ground considerably. He now agrees that relevance judgements made *in vivo* are significantly different from those made under the conditions of the Western Reserve project—a complete reversal of the view he expressed to Aslib.[2] Furthermore, we are now told that the project formerly described as 'a simulated, field experimental approach'[3] is, in fact, an entirely empirical exercise designed merely 'to establish certain empirical reference points with respect to relevance judgements'.

Mr Rees has thus conceded that he is not simulating, even approximately, the process by which 'relevance' is assessed in real research projects. In consequence, his claim to be investigating the influence of stage of research upon relevance judgements[4] cannot be taken seriously.

Similarly, the logic of employing simulated project status reports, rather than simple search specifications, as reference profiles in so empirical an experiment is questionable, and Mr Rees does little to justify his position by the remarkable contention that the two types of document are 'not unlike'.

I recognise that the subject area in which Mr Rees is working is a very proper field for some long overdue research and that, initially, the investigations must be empirical in character to pave the way for later, more sophisticated experiments conducted under conditions of progressively increasing realism. Unfortunately Mr Rees seems unable to give a convincing account of his own experiment.

Yours faithfully,

P. F. COLE

BP Research Centre,
Chertsey Road,
Sunbury-on-Thames,
Middlesex.
8th December 1966.

[1] *Aslib Proc.* 11/66 325.
[2] *Aslib Proc.* 11/66 319, lines 3–8.
[3] *Aslib Proc.* 11/66 323, para 4.
[4] *Aslib Proc.* 11/66 318, para 5.

SELECTIONS FROM THE RECENT LITERATURE

ALL ITEMS listed may be borrowed from the Aslib Library, except those marked *, which may be consulted in the Library.

Books and Pamphlets

AMERICAN LIBRARY ASSOCIATION. Resources and Technical Services Division. Copying Methods Section. *Library Standards for microfilms committee*
Microfilm norms: recommended standards for libraries. Committee Chairman, Peter R. Scott. Chicago, the Association, 1966. 48 p. tables, diagrs. $1.75.

ANDERSON, ALAN A.
Guidelines for the utilization of statisticians in the design and execution of information retrieval system evaluation studies. Santa Monica, Calif., System Development Corporation, 1966. 11 p.

ANDERSON, ALAN A.
Multi-level file structure as a frame of reference for measuring user interest. Santa Monica, Calif., System Development Corporation, 1966. 12 p. tables.
Presented at the International Advanced Study Institute on the Evaluation of Information Retrieval Systems at The Hague, Netherlands, 13th July 1965.

ANDERSON, RUTH *and others*
File organization for a large chemical information system [CIDS]. Washington, National Bureau of Standards, 1965. [20] p.

*BOOKS in print. U.S.A.: an author-title-series index to the Publishers' trade list annual, 1966, edited by Sarah L. Prakken. New York, R. R. Bowker, 1966. 3 vol. vol. 1. author. vol. 2. series. vol. 3. subject. $18.00.

BURNETT, ALFRED DAVID
Cataloguing policy objectives and the computer; a paper presented to the Catalogue Working Party of the Libraries and Computers Group on the 7th September 1966. [Durham, University Library], 1966. 35 p.

CALLOW, J. H. *and* PERRETT, J. R.
Peek-a-boo cards by computer. Washington, ICIREPAT, 1965. 8 p. 6 append.

CANADIAN LIBRARY ASSOCIATION
Library automation projects: a collection of papers by Canadian librarians. Ottawa, the Association, 1965. ii, 50 p. diagrs. (Occasional Paper no. 48). $1.25.

*COMPOSITION INFORMATION SERVICES
Glossary of automated typesetting and related computer terms. Los Angeles, Calif., C.I.S., 1966. 106 p.

*DIRECTORY of library photoduplication services, compiled by Cosby Brinkley. Chicago, University of Chicago, 1966. 65 p. tables. $2.00.

DORSET COUNTY LIBRARY
Subject index. 2nd ed. Dorset, the Library, 1966. iii, 230 p. [Computer produced.]

DOYLE, L. B.
Breaking the cost barriers in automatic classification. Santa Monica, Calif., System Development Corporation, 1966. 62 p. diagrs.

*EUROPEAN companies: a guide to sources of information. 2nd ed., compiled and edited by G. P. Henderson. Beckenham, C.B.D. Research Ltd, 1966. xii, var. paging. 70*s*.

GARFIELD, EUGENE
World brain or Memex?—mechanical and intellectual requirements for universal bibliographical control. 33 p. diagrs.
Paper presented at Eighth Annual Summer Symposium on 'The Foundations of Access to Knowledge', Syracuse University School of Library Science, Syracuse, N.Y., July 30, 1965.

GREAT BRITAIN. Ministry of Technology Regional offices and industrial liaison centres. London, the Ministry, 1966. 19 p.

HAMADA, SHIGENORI
Scientific and technical information activities in Japan. 5 p.
Paper presented at 11th Pacific Science Congress. Divisional Meeting; Science Information, 31st August, 1966.

HANNOVER. Bibliothek der Technischen Hochschule *und* Technische Informationsbibliothek
Verzeichnis laufend gehaltener Zeitschriften. Stand: 1.1.66. Hannover, the Libraries, 1966. [6], 106 p.

HARVARD UNIVERSITY. Computation Laboratory
Mathematical linguistics and automatic translation, report no. NSF-15 to the National Science Foundation. Cambridge Mass., the University, 1965. var. pag. diagrs.

HATTERY, LOWELL H. *and* BUSH, GEORGE P. *eds.*
Automation and electronics in publishing. New York, Spartan; London, Macmillan, 1965. viii, 206 p. (The American University Technology of Management Series, vol. 3, Paul W. Howerton, general editor.) 70*s*.

HEROLD, VIRGINIA PARRY
Bibliography of Project Leviathan documents. Santa Monica, Calif., System Development Corporation, 1966. 9 p.

IASLIC
Draft general code for inter-library loan. Calcutta, Iaslic, 1966.

*INTERNATIONAL BUSINESS MACHINES, INC. Data Systems Division
Technical Information Center thesaurus. 2nd ed. Poughkeepsie, New York, the Division, 1964. var. paging.

*INTERNATIONAL literary market place. European edition, 1966-67, edited by Sally Wecksler. New York, R. R. Bowker, 1966. 98 p. $10.00.

KUMAR, GIRJA
Politics, international relations and law: scope, methodology and classification. London, Asia Publishing House, 1966. xxiii, 209 p. 40*s*.

LEHIGH UNIVERSITY. Center for the Information Sciences
Lecture seminars in the information sciences, 1965-66. Bethlehem, Pa., the University, 1966. 9 p. (Lehigh University. Center for the Information Sciences, Curriculum for the Information Sciences, report no. 7.)

*LONDON UNIVERSITY. London School of Economics and Political Science
A London bibliography of the social sciences, vol. 12, 1965-62—, A–F, —. London, the School, 1966. 1023 p. £15.

MINNESOTA. University. *Center for Continuation Study, and* MINNESOTA. University. *Library School*
Information retrieval with special reference to the biomedical sciences: papers presented at the second Institute on Information Retrieval, 10-13th November 1965, edited by Wesley Simonton and Charlene Mason. Minneapolis, Minnesota, the University, 1966. 199 p. tables, diagrs. $6.00.

OLDING, R. K., *ed.*
Readings in library cataloguing. London. Crosby Lockwood, 1966. x, 278 p. 35*s*.

*ORGANIZATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT
Country reports on the organization of scientific research. London, H.M.S.O., 1966. [8 reports]. 15*s*.

SCOTTISH HOSPITAL CENTRE. Library
Hospital libraries: bibliography no. 2. Edinburgh, the Centre, 1966. [3] p.

THORNTON, JOHN L.
Selected readings in the history of librarianship. London, Library Association, 1966. 408 p.
Based on *A mirror for librarians,* 1948, and *Classics of librarianship,* 1957.

UNITED STATES. Congress. House of Representatives. *Committee on the Judiciary*
Copyright law revision . . . report (to accompany H.R. 4347) . . . for title 17. [Washington, U.S.G.P.O.], 1966. 279 p.

UNITED STATES. Office of Naval Research
DoD manual for building a technical thesaurus [by J. Heston Heald and others.] Washington, the Office, 1966. [21] p.

WALLACE, EVERETT M.
User requirements, personal indexes and computer support. Santa Monica, Calif., System Development Corporation, 1966. 7 p.

Articles and Papers

ALDEN, JOHN
Reproduction vs. preservation. *Library Journal,* vol.91, no.19, 1st November 1966. p.5319–22.
Survey of trend towards indiscriminate photo-reproduction of rare material, in view of concern over their preservation.

ARTANDI, SUSAN
The searchers—links between inquirers and indexes. *Special Libraries,* vol.57, no.8, October 1966, p.571–4.

BEHRSTOCK, JULIAN
Unesco's book development programme. *Unesco Chronicle,* vol.12, no.10, October 1966, p. 383–7

BELFAST University extensions: library building nearing completion. Copied from *Contract Journal,* vol.213, 8th September 1966, p.137–8.

BERTALAN, FRANK J.
Selection and reference use [of government publications] in the special library. *Library Trends,* vol.15, no.1, July 1966, p.143–56.

BOTTLE, R. T.
Shortage of qualified information workers. Copied from *Chemistry and Industry,* vol.45, 5th November 1966, p. 1869–71.

BOUMAN, H.
Einige Mängel von Co-ordinate Indexing-systemen und ihre Behebung. [Some shortcomings of co-ordinate indexing systems and the remedies.] *Nachrichten für Dokumentation,* vol.17, no.5, October 1966, p. 147–52.
The CASE for the aperture card.
Copied from *Systems,* April 1966, p. 54–6, 58, 60, 62, 64, 66, 68, 70.

CHILDS, JAMES B.
Bibliographic control of federal, state and local documents. *Library Trends,* vol.15, no.1, July 1966, p. 6–26.

CLARKE, NORMAN F.
Cataloguing, classification and storage of government publications when incorporated into the general library collection. *Library Trends,* vol.15, no.1, July 1966, p.58–71.

COLE, P. F.
Technical information in the petroleum industry: functions, responsibilities and techniques. Reprint from *Journal of the Institute of Petroleum,* vol.52, no.513, September 1966, p.271–4.

DARLINGTON, JARED L.
Machine methods for proving logical arguments expressed in English. Reprinted from *Mechanical Translation,* vol.8, nos.3–4, June–October 1965, p.41–67.

GOODWIN, JACK
The trade literature collection of the Smithsonian Library. *Special Libraries,* vol.57, no.8, October 1966, p.581–3.

HALLETT, W. J.
Classifying 250,000 drawings by the Brisch system. Copied from *Machine Design,* vol. 36, 13th February 1964, p.140–4.

HARVEY, MICHAEL
The conference game. Reprint from *Occasion,* no.11, p.3–7. Details of conference organization.

HAYES, ROBERT M.
The research program of the University of California's Institute of Library Research. *Library Journal,* vol.91, no.17, 1st October 1966, p.4579–85.

HORROCKS, S. H.
Revision of national salary structure: report of a meeting with NALGO. *Library Association Record,* vol.68, no.11, November 1966, p.392–3, 408.

INFORMATION retrieval comes to textile management's rescue. Copied from *American Textile Reporter,* vol.80, no.35, 1st September 1966, p.9, 44.

JACKSON, ELLEN P.
Cataloging, classification and storage in a separate documents collection. *Library Trends,* vol.15, no.1, July 1966, p.50–57.

KUMARI, SAROJ
Use of sound recordings in the libraries. *Iaslic Bulletin,* vol.11, no.2, June 1966, p.107–18.

LEACH, E. R.
Classification in social and cultural anthropology, and prehistoric archaeology: a select bibliography. *Classification Society Bulletin,* vol. 1, no.2, 1966, p.19–26.

LIBRARY education and the shortage (of both manpower and talent): a symposium. *Library Journal,* vol.91, no.18, 15th October 1966, p.4881–98.

MILLER, JAMES G.
EDUCOM: Interuniversity Communications Council. *Science,* vol.154, no.3748, 28th October 1966, p.483–8. Co-operation between American academic institutions to help application of information science to higher education.

MOROZOV, A. N.
Nekotorye voprosy ragoty vsesoyuzna patentnotekhnicheskoi biblioteki CCCP. [Some problems in the Patent and Technological Library of the Soviet Union.] *Nauchno-Tekhnicheskaya Informatsiya,* no.8, 1966, p.3–6.

MOUNT, ELLIS
Communication barriers and the reference question. *Special Libraries,* vol.57. no.8, October 1966, p.575–8.

NEELAMEGHAN, A.
Analytico-synthetic classification in perspective. *Library Science,* vol.3, no.3, September 1966, p.212–35.

OVCHINNIKOV, V. G.
Tezaurus i nekotorye metody ego postroeniya. Chast' 1. Tezaurus kak sistema klassifikatsii faktor. [The thesaurus and its method of construction. Part 1. The thesaurus as a system of classification of data.] *Nauchno-Tekhnicheskaya Informatsiya,* no.8, 1966, p.24–8.

REVOLUTION in the registry: rotary filing plus microfilm aperture cards solves problems of space, coding and speed of retrieval for NW region CEGB. p.3. Reprint from *Business Systems and Equipment,* July 1966.

ROTHKIRCH-TRACH, KARL CHRISTOPH VON
Methodische textanalyse—referiertechnik im Zeichen der automatischen Dokumentation. [Arrangement of abstracts in regard to automatic documentation.] *Nachrichten für Dokumentation,* vol.17, no.5, October 1966, p.169–74.

ROTHMAN, JOHN
Communicating with indexes. *Special Libraries,* vol.57, no.8, October 1966, p.569–70.

SCHELL, MARY
Acquisition, handling and servicing [of government publications] in state libraries *Library Trends,* vol.15, no.1, July 1966, p.135–42.

SCHNEIDER, KLAUS
Die Herstellung von Stichwort-Registern. [Construction of key-word indexes.] *Nachrichten für Dokumentation,* vol.17, no.5, October 1966, p.175–6.

SCHULLER, I. A.
T.D.C.K.—Organisation und Systeme. [T.D.C.K.—organization and methods.] *Nachrichten für Dokumentation,* vol.17, no.5, October 1966, p.153–62.

SCOTT, PETER
The present and future of government documents in microform. *Library Trends,* vol.15, no.1, July 1966, p.72–86.

SEXTON, PEGGY
To kill a whooping crane: a fresh approach to the problem of educating librarians. *Library Journal,* vol.91, no.19, 1st November 1966, p.5327–32.

SHAW, THOMAS SHULER
Distribution and acquisition [of government publications]. *Library Trends,* vol.15, no.1, July 1966, p.37–49.

SIMS, EDITH MARIE
Selection and reference use [of government publications] in the college and university library. *Library Trends,* vol.15, no.1, July 1966, p.107–116.

SNEATH, P. H. A.
A comparison of different clustering methods as applied to randomly-spaced points. *Classification Society Bulletin,* vol.1, no.2, 1966, p.2–18.

STEPHENSON, G. R.
Scheme of local co-operation for industry. *Library World,* vol.68, no.797, November 1966, p.126–30.

SUDAR, DAN D.
Three levels of library education. *Library Journal,* vol.91, no.18, 15th October 1966, p.4899–4903.

TAULBEE, ORIN E
Model of document retrieval. *Library Science,* vol.3, no.3, September 1966, p.248–58.

TOMAN, J.
Wissenschaftliche, technische und ökomische Informationen in der CSSR. [Learned, technical and economic information in the USSR.] *Nachrichten für Dokumentation,* vol.17, no.5, October 1966, p.163–8.

[TRINITY College] library, Dublin. Copied from *Architect and Building News,* vol.230, 31st August 1966, p.375–8.

U.S. Copyright Bill: 'fair use' of material by the educational world. *Bookseller,* no.3177, 12th November 1966, p.2324–6.

VENKATACHARI, SHRI P. N.
Source materials for locating Indian government publications. *Iaslic Bulletin,* vol.11, no.2, June 1966, p.119–27.

WALKEY, ELIZABETH M.
Communicating with management. *Special Libraries,* vol.57, no.8, October 1966, p.565–8. Relation of special libraries to management in industry.

WHEELER, FRED
Teaching computers to read. *New Scientist,* vol.32, no.520, 10th November 1966, p.282–4. Reliable machines for reading ordinary letters and numerals are being developed, without use of magnetic ink; international type-font is being agreed.

WILCOX, H. E. *and* BLOOMFIELD, M.
Library-user communications on periodical literature. *Special Libraries,* vol.57, no.8, October 1966, p. 559–60.

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ASLIB PROCEEDINGS

incorporating Aslib Information

Volume 19 **February 1967** **Number 2**

ASLIB CALENDAR 1967

March

WED.8.	Chemical Group annual general meeting at Aslib.
WED.15.	Institute of Petroleum Discussion Group. (See paragraph.)
FRI.31.	Scottish Branch annual general meeting and conference, David Hume Tower, University of Edinburgh, 10 a.m.
FRI.31 – SUN.2.	Aeronautical Group annual conference, College of Aeronautics, Cranfield.

April

MON.3 – WED.5.	Repeat of Chemical Group course in Basic Chemistry for non-chemists. Shell Industrial Chemicals Laboratory, Egham. (See paragraph below.)
MON.10 – WED.12.	Further repeat of Chemical Group course in basic chemistry for non-chemists.
FRI.14 – SUN.16.	Transport Group conference at Leicester University.

May

MON.15 – WED.17.	Chemical Group conference at Attingham, near Shrewsbury.

June

FRI.16 – SUN.18.	Electronics Group annual conference, Ashridge House, Berkhamsted.
FRI.23.	Engineering Group visit to National Engineering Laboratory. (See paragraph below.)

October

MON.9 – THU.12.	41st Annual Conference at Harrogate.

Current trends in information work

The first Aslib Annual Lecture will be given at 6 p.m. on Wednesday 5th April at the Lecture theatre of the Royal Institution of Great Britain, 21 Albermarle Street, London W1 by Dr W. E. Batten. The chair will be taken by Sir John Wolfenden, CBE, Vice-Chancellor of the University of Reading.

This lecture is to be the first of a series of annual lectures each delivered by a prominent figure in the information field.

Members who wish to come are advised to apply in good time since only 450 tickets are available.

Application should be made to The Meetings Organizer, Aslib, 3 Belgrave Square, London SW1.

Engineering Group

The Aslib Engineering Group meeting on Friday 23rd June will take the form of a visit to the National Engineering Laboratory, East Kilbride, Glasgow. Full details are available from Mr B. R. Styles, Ministry of Public Building and Works, Leatherhead Road, Chessington, Surrey. (Tel. Lower Hock 5266, Ext. 2127.) All bookings must be received by Thursday 1st June.

Institute of Petroleum Information Discussion Group

A paper entitled 'Co-ordinate indexing and filing' will be given to the IP InformationDiscussion Group by Mr René Snel, Dipl M E, F Inst Pet Senior Information Systems Engineer, Shell International Petroleum Company Limited, on Wednesday 15th March 1967 at 5.30 p.m. The meeting will be held at the Institute of Petroleum, 61 New Cavendish Street, London W1, and tea will be available from 5 p.m.

Aslib members are cordially invited to attend and those wishing to do so should notify the Group's Secretary: Mr A. G. Hervey, Shell-Mex & BP Ltd, MIAC, Shell-Mex House, Strand, London WC2, *not later than Friday 10th March* 1967. Attendance will be limited to 100, so please let Mr Hervey know as soon as possible.

Cancelled date

Aslib members should note that there will not be an Aslib Evening Meeting on 14th March, as indicated in the calendar in January.

Mass Spectrometry Bulletin

The *Mass Spectrometry Bulletin* is a new monthly publication produced and published by the OSTI-supported Mass Spectrometry Data Centre, AWRE, Aldermaston, to help the working scientist keep abreast of research involving mass spectrometry. Each month the *Bulletin* provides relevant references derived from a comprehensive literature search ranging over biology, chemistry, engineering, geology, instrumentation and physics. Other items of general interest to mass spectrometrists are also included. The *Bulletin* is produced

from a computer file, and computer-ordered indexes, including indexes to chemicals and partial chemical structures, permit efficient retrieval of information and data. Annual cumulative indexes will be provided.

The *Mass Spectrometry Bulletin* is produced as part of the data and information programme of the Centre, where several projects are under way. A study is being made of various methods of using low-resolution mass spectra for compound identification. A complete survey of the literature referring to mass spectra has been started with the object of providing a useful reference retrieval service. Finally, the Centre has obtained a copy of the Data Collection on Ion Processes made by Dr H. M. Rosenstock at National Bureau of Standards, USA, and hopes to provide a search service based on this.

Institute for Scientific Information

Mr A. E. Cawkell has been appointed consultant to the Institute for Scientific Information, and will be widening their interests in the United Kingdom and Europe.

The Institute for Scientific Information, Philadelphia, USA, is concerned with scientific information culled from the world's scientific journals, and the rearrangement of it by computer in such a way that some relevant fraction is available to a particular scientist or engineer. The information is available in various forms—for instance in the *Science Citation Index, Index Chemicus,* or *Current Contents,* or by weekly computer search in order to print out items in a field selected by a scientist.

Library Instruction in Further Education

This is the theme of a one-day conference to be held on Wednesday 8th March at Wolverhampton Technical Teachers' College. Speakers will be Mr R. J. P. Carey, Tutor Librarian at Hatfield College of Technology and author of *Finding and using technical information*; Mr W. A. G. Easton, Principal of Southgate Technical College and member of the panel which produced the recent ATTI policy statement *The use of libraries*; Mr D. Christie, Tutor Librarian at East Hertfordshire College of Further Education; and Mr K. W. Neal, author of *Technical college libraries.* Prospectuses may be obtained from Friday 10th February onwards, from the Tutor Organizer, K. W. Neal, at Wolverhampton Technical Teachers' College, Compton Road West, Wolverhampton, Staffs. Applications must be received by Wednesday 1st March. Although the conference is intended primarily for librarians in institutions of further education, it is open to everyone who is interested in the principles and practice of library instruction.

Reprography Congress

The second International Congress on Reprography will take place at Cologne from 25th to 31st October 1967. The organizers are the Deutsche Gesellschaft für Photographie. Detailed information can be obtained by writing to: 2nd International Congress for Reprography, Cologne 1967, 49 Newmarket, 5 Cologne, West Germany.

OSTI support for social science investigations

OSTI has recently awarded a grant of £2,140 to Mr D. A. Clarke, Librarian of the London School of Economics, to carry out a one-year investigation into the characteristics of current literature and information tools in the social sciences. The work will include a comprehensive quantitative study of existing published sources of primary and secondary information, and, following from this, an analytical study on a sample basis of the characteristics of this information.

Also supported by OSTI is a three-year investigation into the information requirements of the social sciences, which is to be carried out by Mr M. B. Line, Deputy Librarian of the University of Newcastle, who has received a grant of £13,145 for the purpose.

The first part of the survey will explore the information requirements of sociology, politics, psychology, economics and education, and the information-seeking patterns currently used by workers in these fields. From this information the requirements of a system designed to satisfy the information needs of social scientists will be drawn up. The adequacy of existing information media will be examined in the light of these requirements, and recommendations will be made for the more effective use of present information tools and techniques where necessary.

***British Technology Index* computer study**

OSTI has recently awarded a grant of up to £4,150 to the Library Association, in support of a feasibility study of the computerization of the clerical and typesetting routines in the production of the *British Technology Index*. When the project is complete, the Library Association will consider its economic aspects and will then decide whether or not to implement the results of the study on a production basis. The Director of the project is Mr E. J. Coates (Editor of *BTI*) and the computer research will be carried out at the University of Newcastle Computing Laboratory, under the direction of Professor E. S. Page.

Medical librarianship

A training course in medical librarianship and communication in the health sciences begins at the School of Library Science of Western Reserve University in July 1967. The course, which leads after one year to the degree of MS in Library Science, will provide training in both traditional and automated methods of information processing and dissemination. Six stipends of $2,400 plus dependency allowance and full payment of fees will be available to 'applicants of excellence and potential'. For further information, contact the Program Director, Professor Alan M. Rees, School of Library Science, Western Reserve University, Cleveland, Ohio, 44106.

Physics conference series

The Institute of Physics and the Physical Society have recently started a Conference Proceedings Series for the publication of the proceedings of conferences which they sponsor and which their committees consider appropriate for full-scale publication. Further information can be obtained from the Institute of Physics and the Physical Society, 47 Belgrave Square, London SW1.

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During the past six months the library has received eighteen unaddressed applications for the loan of library materials. Members who have received no acknowledgment of their applications are advised to reapply, and all members are asked to ensure that each application for loan and photocopy service bears the appropriate mailing directions.

THE INDUSTRIAL ENGINEER

The following report of the Aslib Engineering Group meeting held under the chairmanship of Mr J. Day in Birmingham on 26th October 1966 has been contributed by Mr D. Whale of the Department of Technical Information at Tube Investments Limited.

'Industrial engineering is concerned with the design, improvement and installation of integrated systems of men, materials and equipment. It draws upon specialized knowledge and skill in the mathematical, physical and social sciences together with the principles and methods of engineering analysis and design, to specify, predict and evaluate the results to be obtained from such systems.'

The above definition has been adopted by the American Institute of Industrial Engineers Inc., but the difficulty of framing a succinct yet informative definition of the term 'industrial engineering' means that many people are uncertain of the subjects which come within this field of activity. As a contribution to the solution of this problem the Engineering Group arranged a meeting at which one paper mapped out the subject field and the other indicated the literature and library requirements of the practising industrial engineer.

The Industrial Engineer—His job

In the first lecture Mr A. G. Thompson (Tubes Ltd) stated that industrial engineering consisted of the co-ordinated use of a number of techniques with the object of (*a*) reducing costs, (*b*) increasing efficiency, (*c*) improving management control. The techniques were mainly uncomplicated, though some were complicated and depended on specialized mathematics and sometimes made use of computers. By bringing together the use of both existing and new techniques

into a co-ordinated function, a professional group could be established to ensure that full advantage was taken of the introduction of industrial engineering work. Industrial engineering was a proven, effective approach to cost reduction, increasing efficiency and improving management control in any part of a company's activity or operation. It was not restricted to production problems, but could be used anywhere it was desired to reduce costs and/or improve management control. Ultimately, management control was the fundamental activity with which industrial engineering was concerned and the ultimate purpose of industrial engineering might be considered to be to enable managers to control more effectively.

In the United Kingdom the field of industrial engineering would often be included in the activities of what had become known as management services departments.

After detailing the elements of control, Mr Thompson went on to discuss some techniques associated with cost reduction and efficiency improvement, namely:

(*a*) *method study*, which involved techniques of obtaining information (e.g. filming and time study); techniques of recording and presentation of information (e.g. process charts); techniques of review, appraisal and examination (e.g. value analysis).

(*b*) *operational research*, which could be employed in cases where having carried out the stages in (*a*) the solution to a problem was not clear-cut or relatively obvious or where complex variables were present. Depending upon circumstances a static or dynamic mathematical model could be developed to determine the best answer.

(*c*) *Management control*, the life-blood of which was information—facts, figures, impressions, strategies, plans, etc. The study of management control was therefore very much the study of information, which might involve the study of both existing flow of information and the ideal information system to allow good management decisions and control.

A control system could be usefully thought of as a game, as every control system had some objective or goal and a set of rules. Ideally these should be designed so that the desired objective could only be achieved by the correct route.

Well-known control systems included production control, cost control, quality control, etc., but they were interdependent. For example, good production control was not possible without first establishing quality control and maintenance control.

The science of designing information and control systems was in an early stage of development, but the development effort was considerable.

The Industrial Engineer—His literature needs

In the second lecture Mr A. L. Minter (British Aluminium) reiterated the fact that the field of industrial engineering was diverse and illustrated its interrelationship with other fields, such as ergonomics, accountancy, pure sciences, social sciences, engineering of other kinds, management, etc. It was desirable that practitioners should have some supporting background of knowledge, but

as with many other people reliance was primarily on the core of knowledge obtained from initial education and training, since most practical problems were not technically difficult, but only required work to solve them. However, difficulties could arise during an investigation and these were of the following forms:

Lack of knowledge of facts relating to job—could usually be solved fairly readily if local records had been properly kept, but it would be necessary to locate an appropriate technique and method of use if records had to be unscrambled.

Lack of knowledge of purely factual information—could usually be found by consultation of reference book.

Need to find techniques outside practitioner's own experience in order to make further attempts to solve problem—necessary to make personal contact with another expert or seek details in the literature so that suitable solution could be found.

These difficulties indicated the need for organizing proper access to the knowledge available by (*a*) providing a classification of analytical problems and the techniques that could be used to solve them, (*b*) providing a quick method of retrieving factual information, (*c*) providing a means of finding out how to attack a problem, and (*d*) providing an adequate means of disseminating new information to practitioners, thus facilitating the imaginative application of new knowledge to the solution of their problems.

Much of the knowledge was already recorded in textbooks, journals, transactions of learned societies, and in internal reports, which media, together with lectures, were also the means of disseminating new information. Abstracting services existed to assist coverage of these media, but one list of abstracting journals covering subjects associated with industrial engineering included no less than twenty-eight titles! To rationalize the position the British Aluminium Co. Ltd had introduced *Industrial Engineering Abstracts* for circulation within associated companies.

The experience of the Institute of Work Study Practitioners had shown that many people sought personal contact with others who had tackled similar problems. Mr Minter stressed the need for better classification and indexing of all forms of literature, particularly abstracts journals, to facilitate approaches from different directions and viewpoints. He also referred to the desirability of making reports more readily available from some recognized source even if they had not been published.

Like searchers in many other fields the industrial engineer was normally only to a limited extent concerned with what he could get from outside his immediate organization and the proportion of people who would quest for information was small. It would, however, be a practical step to make a survey of the use of the literature by industrial engineers with regard to readership of journals, the use made of textbooks, the number of times abstracts provided something of interest, the use made of library services and the number of times they have been baffled. The result might then provide a basis for assessing the nature of the demand and for future action.

Discussion

Mr F. Liebesny (British Aluminium Co. Ltd) gave further details of *Industrial Engineering Abstracts,* stating that the contents were based on items in eighteen selected journals. Although originally intended for internal circulation copies of the *Abstracts* would be made available to people genuinely interested in this field. If support were forthcoming consideration could be given to publishing the *Abstracts* on a co-operative basis, with British Aluminium Co. Ltd providing the editorial effort in the early stages.

THE MECHANIZATION OF SERIAL RECORDS WITH PARTICULAR REFERENCE TO SUBSCRIPTION CONTROL

M. A. SCOONES, F.L.A.
Shell International Petroleum Company

Evening Meeting, London, Wednesday 26th October 1966

UNTIL 1964 we in Shell Centre produced annual reviews of journal subscriptions, circulation and reader service from three separate manual records. We had no effective union listing of the location of subscriptions by title as our buying records were arranged by division.

Not only was a great deal of effort involved in producing these records, but the resulting listings were progressively more and more out of date.

In order to speed up this process and make it more accurate, it seemed reasonable, therefore, to try mechanization, especially as Shell Centre possessed its own data processing centre and there was computer time availale.

My purpose, therefore, this evening is to describe a straightforward project for the mechanized control of subscription, circulation and specialized abstracting records.

Dr Coblans has outlined two basic approaches to the application of mechanization[1]. The first is the 'overall' philosophy aimed at a totally integrated system combining descriptive records with information retrieval and dissemination. Such an approach is typified for the present by ALPHA (Automated Literature Processing Handling and Analysis),[2] the system under practical development at the Redstone Scientific Information Center, U.S.A., and for the future by Project Intrex.[3] The second approach is the 'housekeeping' philosophy which seeks to mechanize an isolated phase or related group of library operations, forming part only of the total library and information problem. Usually this precludes any sophisticated approach to IR. 'It has, however, been more widely adopted for several reasons. Firstly, with housekeeping' it is simpler to define concrete requirements, whereas in applications involving IR we are not yet absolutely certain what we wish to do, and hence how we propose to do it. Secondly, it is easier to present an economic justification for 'housekeeping' projects to those who hold the purse strings. The large scale of most 'overall' approaches reflects the economic viability of mechanized handling for large quantities of data, and suggests that for most of us working in the information field a piecemeal use of mechanization will be valid for the immediate future. The 'overall' philosophy seems to involve the modification of a company's structure to fit its information system, the suitability of which depends on the importance of information relative to the purpose of the organization.

The mechanized control of subscription records is a typical 'housekeeping' operation. Success depends upon four interrelated factors: a sound organization of the system to be mechanized; an efficient central purchasing organization; a rationalized internal structure similar in nature to that achieved in recent years by Shell and ICI; and lastly, the realization that such a system will tend to upgrade the level of staff involved in its maintenance. Computers do not save staff; they do make for their more efficient employment.

In any large industrial organization two basic approaches exist towards literature purchase. One approach is the independent purchase of literature by each unit at an agreed organizational level. Such an approach is sound where the purchasing units are completely autonomous administratively and widely dispersed geographically (for example the ICI divisions). Where the various divisions are combined in a central administrative complex (for example Shell Centre) centralized services are generally a logical proposition. Given that the problems of literature purchase are widely dissimilar from those involved in the acquisition of any other material, what more natural focal point could exist for this purpose than a library?

A library or information unit engaged in the centralized ordering of serial literature will need to perform certain operations, some being directly concerned with subscriptions control and others relating to literature exploitation. Each subscriber should be able to demand a full list of subscriptions at any time, but, more importantly, an annual review of subscriptions will ensure that they are not wastefully continued when they no longer match a user's subject profile. At Shell Centre we intercalate with this information details of circulation originating from the library, and also our readers service—a system of tailor-made abstracting to briefs supplied by users. The information in this last item is in no sense part of a mechanized system of SDI. The library needs to make the fullest use of serial literature in the building by tapping the resources of outside specialist divisions taking titles not represented in its own stock. A union listing under each title of all internal locations will to a large extent meet such a need. The basic data for such a listing is the same as for an annual review, save that the search factor is different—for an annual review titles are listed under location.

It is the fundamental capacity of the computer to juggle the data stored, presenting the same information according to different search factors, that makes mechanization attractive. But aside from this basic facility one has to decide at what point it is economically justifiable to mechanize a set of records. Pure quantity of data alone is no criterion. The number and frequency of operations to be performed with the data store and the number and frequency of modifications made to that store are also important. The number of changes we make in a month average five hundred. The deciding factor was the three months it took to type annual lists intercalating data from three separate records. Another factor was the opportunity mechanization presented for rationalizing our serials purchase records, which had grown like Topsy. At our rate of change some manual records would be impracticable, since they would soon become unreadable. I am thinking here of location records under title. In practice it would not be possible to justify the cost of staff needed to maintain

such a record manually up to the standard of present machine accuracy. One advantage of a mechanized approach is the self-correcting effect of the delight people take in finding errors in a record derived from magnetic tape. We had originally only 3,800 titles and 9,000 subscriptions. There were forty-five main recipients, with others subordinate to them. Many of the changes made since then in our data are small and reflect minor internal changes within divisions. Other changes, however, are caused by major changes in the internal structure of the company, which are themselves a reflection of external pressures, such as for example, the development and utilization of North Sea gas. I have stressed this in order to underline the fact that most of our problems do not reflect any failure in the literature selection process, but are rather the measure of our success in matching literature to a set of constantly changing subject profiles.

Effective intellectual organization, which means clearly defined categories and consistent coding, is the key to success in data processing. Part of this intellectual organization in our case is the manner in which our company's internal structure is coded. Each division and its sub-units possess reference indicators, which are a series of mixed notation codes. The primary alphabetic element in these codes is of a mnemonic character reflecting function. The numerical element, employing the decimal principle of division, reflects subordination within the area covered by the alphabetic coding. These codes, which are universally recognisable by the company's staff, were introduced partly because they were amenable to computer applications.

Each division has an Administrative Service Unit (ASU), responsible *inter alia* for channelling literature purchase requests for purely divisional use to our Acquisitions Unit. In our programme and form design we take account of this. Annual review listings, for example (Fig. 1), are headed by the ASU indicator; titles are sub-arranged alphabetically on the left; then follows cost; number of copies subscribed to; circulation copies; Readers' service represented by an X and sub-recipients in the Remarks column. To the right of this are blank columns for noting next year's requirements.

Before proceeding to the mechanics of setting up the system a few words on cost seem appropriate. Initial setting-up costs were £2,000 on systems work by our own Data Processing Centre plus the cost of three senior and two junior staff for four months. Normal running costs average £50 a month for data processing. This increases to around £400 for the total cost of the whole October–December quarter when an increased number of cards are punched to incorporate annual review amendments. During the previous quarter, July to September, data processing costs are nil, as these amendments are then being received and written on to cumulated booking forms. Data processing costs for the three months April–June are about £300 for the whole period, but this reflects machine time for running the annual review. Where a special listing such as our library holdings list is run on successive months for testing purposes, this sharply increases costs. The cost of systems work is high, and when such work involves the further development of an existing programme it is higher than at the initial development stage. A recent extension cost £560. As to the question of library and information staff time spent in maintenance, during a normal working month three days of my own time are spent on updating.

During the month of August I spend ten days on this work and during September I am working virtually full time. During this period I am preparing the annual review updating.

Preparing the computer programme is an exercise in collaboration between the information officer and the programmer. The information officer's role is of a two-fold nature partly consisting of reason—the major part if the job is done properly—and partly consisting of faith. The part involving reason consists of clearly defining all needs at the planning stage. All requirements should be listed, ranked according to priority, ranging from the absolutely essential, passing through the desirable but not essential, and terminating with the desirable but definitely expendable. This will ensure that the essential tasks are coded in optimum detail and beyond this point the fullest range of possibilities are handled adequately. This would seem preferable to coding a wider range of items in some cases less than adequately. Once a programme is compiled it becomes a relatively inflexible instrument and this fact probably explains the higher cost of systems work when any development work is carried out after the stage of initial programme compilation. As regards that part of the task involving faith—just pray that you haven't forgotten anything or, worse still, that the programmer isn't changed in midstream.

A number of points requires attention at the outset. Of particular importance is the need for adequate provision of core space for title numbers, in order to build in cardfile flexibility. For example, eight digits (99,999,999) would permit the allocation of 2,000 titles spaced at intervals of 50,000. By contrast, if you attempt to distribute 5,000 titles in a five-digit core, space becomes tight after a short while, and a very *short* while at that. Of course, you can struggle on like this for some time, averting chaos by the time-consuming expedients of cancelling and re-allocating entries. Then a new subject area arises and with it a new set of titles largely confined within the narrow alphabetical compass of the term normally used to denote that subject. Should you start with seven digits, however, you can sleep peacefully in the sure knowledge that everything will run along quite smoothly till you retire or they change the computer, whichever comes first. In the actual work of allocating serial numbers to titles some guidance will be provided if you keep beside you a chart showing the proportionate alphabetical distribution of cards in your author catalogue.

If you plan to build in the capacity for a classified bibliography of periodicals, a sort of home-grown *Ulrichs'*, then please remember all that has been said about coding in so many Aslib meetings. As an operation purely supplementary to our main purpose of annual reviews and a union listing, we made two columns available for such a class coding, although provision to print-out has not yet been developed. Form was particularly important in this, as lists of newspapers and of directories and annuals would be quite useful. But when one is faced in practice, as for example with statistical publications, by conflicts between subject, geographical area covered and form, often of both the inner and outer varieties, it becomes clear that three columns would have been a more appropriate space allocation. Any print-out we ultimately attempted would, I feel sure, show the serious dangers of attenuated coding. Even when consistently applied, such a listing would prove less than comprehensive at many points. I would defy

Bliss, Cutter, Dewey and Ranganathan to get a quart in a pint pot, and, what is more, avoid cross classification at the same time.

Generally, in thinking about coding, the information officer's vital interest in classification should be of value, as a corrective to some aspects of the normal approach of a programmer. Most of the latter's experience will be derived from business applications, and he will attempt to translate our requirements into a pattern derived from this type of work, and which is not necessarily suited to bibliographical requirements. If the resulting compromise is not entirely satisfactory, this will probably be due to a lack of clarity on the part of the information officer.

Where in the context of our type of project it is desired to provide for the separate printing out of a library holdings list, this information will also appear in the line of bibliographical and supplier data in the union title listing (Fig. 2). If the organization has only one main library there are no coding problems. If there is more than one, then, in my view, even with only two locations, this listing which is itself a union listing, should if possible list the holding of each location specifically, where the same title is held for varying periods by both of them. This is not to deny that we get along quite well by listing the longest comprehensive holding coded to both the Upstream and Downstream libraries —a compromise enforced by the limitations of the eighty-column punched card. When such a listing is widely circulated this approach may waste some time for the uninitiated user. Of course with more than two locations, specific coding of holdings naturally acquires paramount significance. One thing which might well have been omitted to permit the specific coding of location, apart from class, which is debatable, is the mechanical tracings system. This system aimed at the automatic deletion of relevant references on the deletion of a main entry. The space available consisted of two five-digit fields only (now defunct) in the PRIMARY INFORMATION form which I shall describe shortly. It was found in practice, however, that the separate deletion of references resulted in superior accuracy.

Arising directly out of the programme are the booking forms, which consist of a green, primary input series and a buff amendment series. I shall deal first with the primary input series. These forms are used for the creation of the basic record, the addition of new titles, and the creation of another entry for an existing title, where such an entry relates to variable information about supplier or method of supply. The first of this series is the PRIMARY INFORMATION Form (Fig. 3). The top line, card type A, is for a normal, commercially produced title or a corporate author, while card type B is for the title of a serial produced by such a corporate author. Card type C provides for either alphabetic codes or natural language designation of a variety of supplier and bibliographical data. Positions 69/73 and 74/78 have been left at five digits, so that they are now useless for tracings, pending their total removal from the programme. Seven digits are now employed for fixing a title or reference in its correct alphabetical location (see the title number in the top left-hand corner), for which purpose we use 'nothing before something' alphabetization, with very few frills. This extension from five to seven digits was achieved by attenuating the coding for booking dates.

We use three codes for the inclusion of addressee information. The first of these is card type D for direct subscriptions. The A/D field (positions 12, 35 and 58) on this form can in practice only be coded for addition to the primary input series. D standing for deletion is used in the amendment procedures to be described later. The number of copies fields (positions 13/15; 36/38; 59/61) on this form are written in the manner: 100 for 100 copies; 010 for 10 copies; 001 for one copy. In other words, the field is filled up with zeros written leftwards. The reference indicator fields (positions 16/24; 39/47; 62/70) on this form, are almost invariably used to incorporate 'reference indicators' of ASUs. (See page 58). The only exceptions are people who have risen so high in the organization that they do not have a reference indicator. Sometimes we have to play havoc with a man's name to code it, but mercifully they generally appreciate the cruder results of data processing when they reach such heights and cheerfully accept it. The attention fields (positions 25/33; 48/56; 71/79) on this form are used to code specific indicators or names of individuals. We keep names of individuals to a minimum. These last place their orders through ASUs and their subscriptions appear on the relative ASU listings. The S/P fields (positions 34/57/80) on this form enable us to add X, which appears on the title listing in this form and as an asterisk on the annual list print-out. We then write in any explanatory note required. The attention fields also enable us to code a trial subscription as T, in conjunction with an expiry date, in positions 31 to 36 (card type C).

Obviously we shall have more than three recipients for most journals, so we continue on an ADDRESSEE INFORMATION Form (Fig. 4), writing D into position 11, and the relevant subsequent positions, and continuing as before on as many lines as we need to complete the record of direct subscriptions. The addition of circulation is achieved by the entry of card type E in position 11, and then by continuing with the entries in a similar manner to that used for subscriptions until the operation is complete. For readers service we use card type F and a similar procedure, except that we substitute OOX in the number of copies field as the matter of numbers is irrelevant in this context. As many ADDRESSEE information forms as necessary can be used, providing they receive the title number of the relative PRIMARY INFORMATION form, and provided the total number of addressees on one title does not exceed 250. In the rare cases where they do, a continuation entry based on subsequent title numbers should be made. This occurred in our experience only once with the *Financial Times*.

The final form in this series is the SECONDARY HEADINGS form (Fig. 5) which is used for making references. Had I designed this form I should have called it REFERENCES, as this more clearly defines its function. Provision exists for two references per form, but in practice one reference on each form is a better procedure, as this makes for more effective control of a batch of forms in alphabetical/title number order. The data referred form is recorded on card type G (positions 13–70) and the data referred to is recorded on card type H (positions 13–70). Three varieties of reference are possible: SEE references; NOW references for changed titles; and SEE ALSO references (one of our afterthoughts). SEE references are made by writing code S in the SNA field

(position 12); NOW references are made by writing N in the SNA field (position 12). For SEE ALSO references our technique has varied. They were added to deal with those technical societies (often American) which, although they possess a distinctive name, form a branch of a more comprehensive society. For example the Society of Petroleum Engineers of the AIMMPE code A is written into the SNA field (position 12) but does not print out. SEE ALSO is written after the data in card type G (positions 13–70) and prints out as part of the content of this field.

Each of the forms so far described has a complementary buff form for amendment purposes, with complementary card types M, N and O for altering data on subscriptions, circulation and readers service. These and the two other forms used for amendment are described below.

An operating manual should also be compiled, giving a stage-by-stage outline of the methods, card types and codes to be used during the primary booking of information and the subsequent amendment of the primary input data. Details of the forms of names and compulsory abbreviations to be adhered to should be included. When booking commences, each assistant must work closely with the manual just as a novice cataloguer should work closely with a cataloguing code. But, as with a cataloguing code, the answers to frequently occurring problems are soon committed to the memory and reference back need only be made for the less common difficulties. There is of course, as with a cataloguing code, the danger of thinking you know the rules and unconsciously adding modified procedures. The manual takes on in many respects the character of a cataloguing code, though the intense effort at rationalization necessary for computer input generally makes it rather duller reading than any example of the latter, even those with ultra-clear, post-Lubetsky rulings. In retrospect, I believe that the manual should include a section on the principles of descriptive cataloguing to be used, quite apart from the natural appearance of individual rulings in relative parts of its text. As a final point on this matter one should make sure that those directly involved with data processing are liberally supplied with copies of the manual.

Over the last few years a great amount of work has been done to reduce cataloguing to general principles, from which special applications logically derive. This is in sharp contrast to the situation that had developed over the years, whereby cataloguing codes became a mass of exceptions, so that general and rational principles tended to be obscured. Such a rationalization, though not consciously aimed at preparing for data processing, was an excellent bibliographical prelude to the machine age. The aim of this work has been towards a single standard. Data processing could, I believe, modify this approach by creating not one but a series of standards, designed to meet varying requirements. The computer, with its flexibility, could compensate for this diversity by its ability to juggle with the various elements in an entry.

Within the field of serials cataloguing, there remain plenty of justifiable exceptions to whichever approach is taken. In order to achieve a consistency such as could be communicated to those involved in data processing input, we chose one general approach and excluded most exceptions. This simplified and probably speeded up the input operation. At present we are tending to modify

this approach in the light of operating experience, and in particular we are now very close to achieving an absolute conformity with the serials entries in our own author catalogue. As to filing rules, the two basic approaches of 'nothing before something' and 'all through' are rarely used unmodified in practice. A set of artificial exceptions has been designed, allegedly to meet the needs of users, although guide cards are used to communicate their pattern. We chose, as I said, 'nothing before something' alphabetization, using filing rules in general conformity with our existing library method, and establishing the order ourselves. I believe we could have achieved a totally consistent order by leaving this matter entirely to the computer people. Although consistent, however, it would have proved unfamiliar in many respects to a librarian. In this connection I believe the Americans are now considering a new set of filing rules suitable for use in both manual and machine applications. If this work is done it should prove most valuable. Maybe we are in a situation comparable to the gradual modification of the hansom cab in its traditional form by the addition of the internal combustion engine.

Our project involved a systematization of our Acquisitions Unit's records. The rulings reflected in the title print-out have easily been absorbed by a highly intelligent group of non-professionals and have served to maintain the consistent approach we initiated in their manual records, which had grown up rather haphazardly. We have received criticism of our approach as not falling in with that of divisions receiving annual lists. Since these are many, variable and inconsistent within themselves, and our approach is at least logically defensible, we may hope to exercise a long-term influence in favour of conformity. In this matter, our situation was not unlike that of Lord Melbourne's Cabinet; it did not matter so much what we said, so long as we all said the same thing. Moreover, our standard had to be simple and easily communicable, even though we could never hope to please everybody. The provision of more adequate description in our annual review listings has caused the ASUs to vie with each other in finding errors in our work. This feedback delights us and enables us to incorporate improvements.

The key to our cataloguing method is the entry of all titles, distinctive or otherwise, originating from corporate bodies, under the fully expanded forms of the names of those bodies, with generous references from the variant forms of the names of corporate bodies, acronyms, and distinctive titles. A block of references from acronyms appears at the start of each letter of the alphabet. About 60 per cent of our titles originates from corporate authors. Normal commercial publications generally require fewer references, usually from the earlier to the latest form. In this context we have about 1,000 references to 3,800 titles.

Before you start this job, supply yourself with an adequate collection of periodical bibliographies and use the excuse of this operation, if necessary, to strengthen your library stock in this area. The first thing you will notice about the national Press directories, despite the valiant efforts of UNESCO, is just what a wretched lot they are. I have a sort of inverted Zipf's law about them which runs 'the greater the bulk the lesser the content'. This is doubtless the result of frequent fruitless searches in *Ayers*. Start by building up an authority file on

5 in. by 3 in. cards, including references, with full bibliographical details and tracings on each main entry. Our Acquisitions Unit records were arranged primarily by division, and then by title, so our assistants had to move from the authority file to the Acquisitions serial record, letter by letter, stamping each subscription card record as they went, and checking all possible variants. Some of these variants were such that an information officer might only dream of them in a wilder flight of fancy. We incorporated them as references, at least temporarily, till the logic of our method had achieved wider acceptance.

The people punching cards for translation on to magnetic tape, for use on the IBM 1410 and 1401 computers, want to receive the work in small batches, but if you let them persuade you into sending the work to them letter by letter, you will build up a splendid file of amendments to be added when the work is ostensibly completed. Although these can easily be handled, it is well to remember Panizzi's experience with the 1841 British Museum catalogue and avoid the situation like the plague. This approach will also ensure the most rational distribution of the alphabet throughout the available core.

Those who have some background in historical bibliography will recall the technological changes which have influenced the development of our alphabet. I am not suggesting a similar influence for computer input, but there is some analogy with the way one has to write input booking forms. Each character is written in capitals within a small oblong, and since we must make sure that the punch operator makes as few mistakes as possible we cross through the letter Ø, Scandinavian style, underline S to distinguish it from 5 and heavily serif I to distinguish it from the figure one. Most of us will appreciate this need, since we know from writing catalogue slips how a character perfectly clear to ourselves can be misread by a typist. The danger is that after several weeks of writing dockets like this, those methods enter one's normal handwriting. A word about abbreviations: these should be few in number, but they should be used consistently. Space is rarely inadequate, though occasionally a joker like the USSR Society for the Propagation and Dissemination of Political and Scientific Knowledge turns up.

The bibliographical data about a publication is standard. Data about supplier and method of supply is subject to variation for two reasons. Wherever such variants appear, more than one 'main entry' is required. The first of these, digitally speaking, will be the entry to receive data on class, country of origin, language, and library holdings, if applicable. Some causes of variation are justified. For example, one supplier will deliver by post and another by van, either of which arrangements can be justified by circumstances; one copy is worth receipt by airmail, while the bulk arrives by sea; one copy may be a trial subscription, which may ultimately be simply deleted, deleted and added to a standing order entry, or itself converted into a standing order entry. An unjustified cause of variation would be the multiplication of suppliers for a single title, for no special reason. Our creation of a detailed record under title was a means of throwing this into relief and, where practicable, of eliminating it. An essential point to remember when dealing with a work of variable subject interest appearing in parts, such as ASTM Standards, is the need to treat each part as an independent entry. Subscription requirements will vary according to

the subject interests of the subscriber, and such an approach will build in maximum flexibility from the very start. In order to make the fullest use of the system, the term 'serial' is considered as having the widest possible scope, including periodicals, newspapers, annuals, directories, encyclopaedic works appearing in parts and ultimately to be completed, and legal and medical works, for which fresh editions appear every few years.

Amendments are carried out on a monthly batching basis. For this purpose we employ five buff forms, three of which are complementary to the green forms already described, except that they include a series of complementary card types JKLMNOPQ. The first of these is the buff PRIMARY INFORMATION amendment form (Fig. 6). To alter any data in card types J K and L the new information is written into the appropriate field. To purely delete information, dashes are placed in the appropriate positions within the field. The eight-digit title number (which now includes the final check digit) is written into the designated box CC in the top left-hand corner of the form. Of course, changes in card types J and K will usually alter the alphabetic location of an item, requiring its total deletion and the creation of a new entry using a green PRIMARY INFORMATION form and, as required, green SECONDARY HEADINGS forms for compensating references. There is also a buff ADDRESSEE INFORMATION amendment form (Fig. 7). We amend subscriptions by writing M in the card type field and A or D in the A/D field for add or delete. A change in the number of copies involves the total deletion of an entry and its total replacement. 'Entry' in this sense means one piece of location data. A similar procedure using card type N is applied for circulation data and card type Ø is used for readers service. A buff SECONDARY HEADINGS amendment form (Fig. 8) (card types P & Q) is used for amending references. Changes in card type P (data referred from) will usually involve total deletion, as it affects the alphabetical location of the entry, so that in practice most use of this form occurs in card type Q (data referred to). A dash in position 12 (card type Q) will remove a reference from the Holdings List print-out only and great care is needed in this, as subscriptions may still be running, necessitating the general inclusion of a reference in the title print-out at a time when our library holding itself has been deleted. The next most generally used form after the buff complementary amendment series is the buff DELETIONS form (card types Y and Z) (Fig. 9) for the total deletion of a main entry (card type Z) or a reference (card type Y). The eight-digit serial number is written into positions 1 to 8, followed by Z in the card type position to delete a main entry, and Y in the same position to delete a reference.

The last form in the buff amendment series is the REFERENCE INDICATORS form (card type I) (Fig. 10). This is a new addition and at present it is only in the process of being tried on a few small-scale recipients to test its efficiency. This form will be used ultimately for bulk changes of location code throughout the record. Wherever indicators are changed within the organization a divisional print-out will be obtained. Each sub-indicator or personal name in the Attention field is treated as a variant in combination with the data in the Reference Indicator field. All such variants are listed, and on this form the replacement automatically follows the information to be changed This

procedure will affect a change throughout the data store, thus avoiding the drudgery of changing an indicator repeatedly, possibly several hundred times, under each of the titles involved. The repetitive nature of this work has been a source of error in the past.

When the amendments have been carried out by our Data Processing Centre they return to the library an updated set of the relevant sheaf slips and a print-out of errors. This list of errors is checked and amended before a fresh sequence of amendment begins. While a batch of amendments is being processed the work of writing booking forms is suspended until operations can be recommenced on a completely updated record. With any large number of total deletions (card types Y and Z), such as result from annual list updating we use preliminary digit filing. A set of deletion sheets is devoted to each of the numbers 0 to 9. In effect this is the reverse of terminal digit filing applied in a manual uniterm system. With annual list updating we obtain a completely fresh title print-out and thus save the work of filing amended sheafs, since a large proportion of titles is in some measure affected.

Obviously, in all the procedures outlined, errors must occur. What are the sources of these errors, to what extent are they acceptable, and how may they be avoided? We operate on a monthly batch principle, with three months closed period to incorporate annual list amendments, and this last involves some 40 per cent of the titles in the system. Annual review amendments have to be cumulated, as changing divisional requirements interact. The larger any batch of amendments is, the greater is the number and proportion of errors. The more errors requiring further amendment, the larger become the succeeding batches, so that several months may pass before the system is relatively error free.

I began work on the assumption that a computer sorts on successive differences, but found that in the specific case of all data being identical in all fields except the final S/P field, such items were regarded as totally identical. The problem was dealt with in practice by the consolidation of addressee information. Minor changes of title or the correction of a misspelt word often fail to be picked up and result in the reply that an error has been made. This involves repeating the original work of amendment often accompanied by a written explanation.

Compound surnames, for example Van Osch, are best compounded into a single element, since, although both parts are on tape, one only (the first) may print out in a particular format. This creates particular difficulties in assessing the correct version for subsequent amendment. Generally speaking, monthly lists of errors suggest a ratio of 80 per cent punch unit errors to 20 per cent library errors, which with care may be brought down to 90 per cent punch unit and 10 per cent library. Of the total errors at any one time 50 per cent are of a recurring nature. These are very few indeed, but they require persistent and careful instructions to remove. In this class of error are those items listed by data processing as not on tape, although they appear on the print-out, and conversely those items listed as already on tape, which are not on the print-out. An analysis of this last fault suggests that the source of error lies in the amendment procedure, and a programmer is currently investigating this. She believes that to some extent these difficulties are due to the use of Autocoder language,

which in Shell is being superseded by the use of COBOL and FORTRAN. When we have removed this particular weakness I am quite satisfied that we shall have an economically acceptable level of errors. Both the preparation of booking dockets and presumably the punching operation are monotonous and tiring, but require great attention to detail.

A minor difficulty that seems worthy of mention is the inaccurate 'guillotining' of output. One should keep an eye open for this and ensure that it is corrected, as it could result in the absence of information at just that point where an inquirer needs it.

REFERENCES

1 COBLANS, HERBERT. Use of mechanised methods in documentation work. London. Aslib, 1966.

2 CROXTON, FRED E., *and others*. ALPHA *Sci.-Tech News*, vol. 18, no. 3, Fall 1964. pp. 79–82.

3 INTREX: report on a planning conference on information transfer experiments. Cambridge, Mass., MIT Press, 1965.

DISCUSSION

Mr R. Coleman (Cambridge University Press) asked whether operating experience suggested that the use of codes rather than natural language in 'primary information' booking would have eliminated any of the reported errors.

Mr Scoones did not think so. Areas where code was used at present involved a relatively small number of standard variables, which were easily committed to memory. Their extension would involve the creation of a complex key, slow down input, and increase chances of error. These errors would involve completely incorrect print-out as opposed to the present spelling errors which are noticeable at both the input and output stages. As to the class-marks, even if the classes were viable, which they were not at present, print-out under them would involve subject indexing. Broad subject headings in natural language would provide crude but immediately useable listings superior to present provision.

The Chairman, Mr Line, asked whether any use of the data for statistical analysis was envisaged, and remarked that in his experience a library typist familar with library documents and style was faster and more accurate than a professional keyboarder dealing with this sort of material.

Mr Scoones agreed on the latter point and stated that no statistical work was planned.

Mrs E. V. White (National Physical Laboratory) asked whether the circulation list slips were incorporated and could be printed out updated from the computer input.

Mr Scoones replied that it would be possible to print out circulation slips in this way, but would hardly be economic owing to delays resulting from monthly batching. It was quicker to use normal reprographic methods.

STANDING ORDERS FOR PERIODICALS 1966 REVIEW — DIVISION - MK/014 — PAGE 02

TITLE	APP. COST PER SUB. £. S. D	PRESENT STANDING ORDER: DIRECT COPIES	CIRC. COPIES	R.S.	REMARKS	FUTURE ORDER (FROM 1.1.67): DIRECT COPIES	CIRC. COPIES	R.S.	REMARKS
ASSOCIATION OF ASPHALT PAVING TECHNOLOGISTS - PROCEEDINGS TECHNICAL SESSIONS		1	0	0					
ATLANTIC REFINING CO - ATLANTIC MAGAZINE		0	0	X	MKP/212				
AUSTRALIA & NEW ZEALAND BANK - QUARTERLY SURVEY		0	0	X	MKP/212				
AUSTRALIAN HIGH COMMISSION IN THE UK - AUSTRALIAN FINANCE & COMMERCE NEWSLETTER		0	0	X	MKP/212				
AUSTRALIAN ROAD RESEARCH BOARD - PROCEEDINGS		1	0	0					
AUSTRIAN ROAD FEDERATION - DIE STRASSE IM SCHEINWERFER		1	0	0					
AUTOCAR	6.10.00	2	0	0					
AUTOMOBILE ENGINEER & INDEX	3. 5.00	1	0	0					
AUTOMOTIVE INDUSTRIES									

FIGURE 1

SERIAL NO-6558Q008 CROSS.REF — PETROLEUM TIMES DATE 01. 7.66

FREQUENCY	METHOD OF DISPATCH	SUPPLIER	APP. COST £. S. D	TRIAL SUB EXPIRES	CLASS	COUNTRY OF ORIGIN	LANGUAGE	LENGTH OF HOLDING	LOCN	READER SERVICE
FORTNIGHTLY	VAN	PUBLR	5.05. 0		QO	UK	ENGLISH	11899-	UPON	YES
DIRECT SUBS										
1 FNR/4 X	1 FNTX X		2 MA/01		X	1 MR/01	X	1 PSAL/2113		X
9 PSAL/212 X	3 RA/01 X		4 SP/0		X	1 SP/0 (SPD/23)	X	1 SP/0 (SPP)		X
1 SP/0 (SPP/32) X	2 TR/013 X		4 CPNL/0		X	1 FNCO/3	X	1 SHELL UK (EXPLOR)		X
51 PTL/3	1 FNCO/2	(JOLLYE)	2 MK/013		X	2 SR/0		1 MK/011		
3 PNL/011	1 MK/012		1 UCL	(ASU)	X	2 MK/014		1 SEPE	(LOWESTOFT)	
CIRCULATION										
1 FNTO/5	1 MA/01		1 MK/013			1 SAL/0	(SAL)	1 TR/013		
1 HYAMS (HAMPSTEAD)R	1 HOFLAND		1 NG/0			1 MK/014		1 PSAL/2111	(BROWN)	
1 RSPL (SHELTON)	3 MK/011		1 DCO	(WINTER)		1 SP/0	(SPR/2)	1 SP/0	(SPP/2)	X
1 SP/0 (SPP/523)	2 RA/01									
READER SERVICE										
X FNC/54	X RA/01	(RA/1)	X RA/01	(RC)		X RA/01	(RM)	X TR/013	(TRI/1)	
X TR/013 (TR/63)	X TR/013	(TRU/211)	X MK/011	(MKM/723)		X CPNL/0	(CMK/82)	X MK/014	(MKP/212)	

FIGURE 2

Ref. Punch Unit—
Booking date cols.

Central Information Services Subscription Records

PRIMARY INFORMATION

Use this form for the initial input of all main heading entries.
Card types A, B, C, D only.

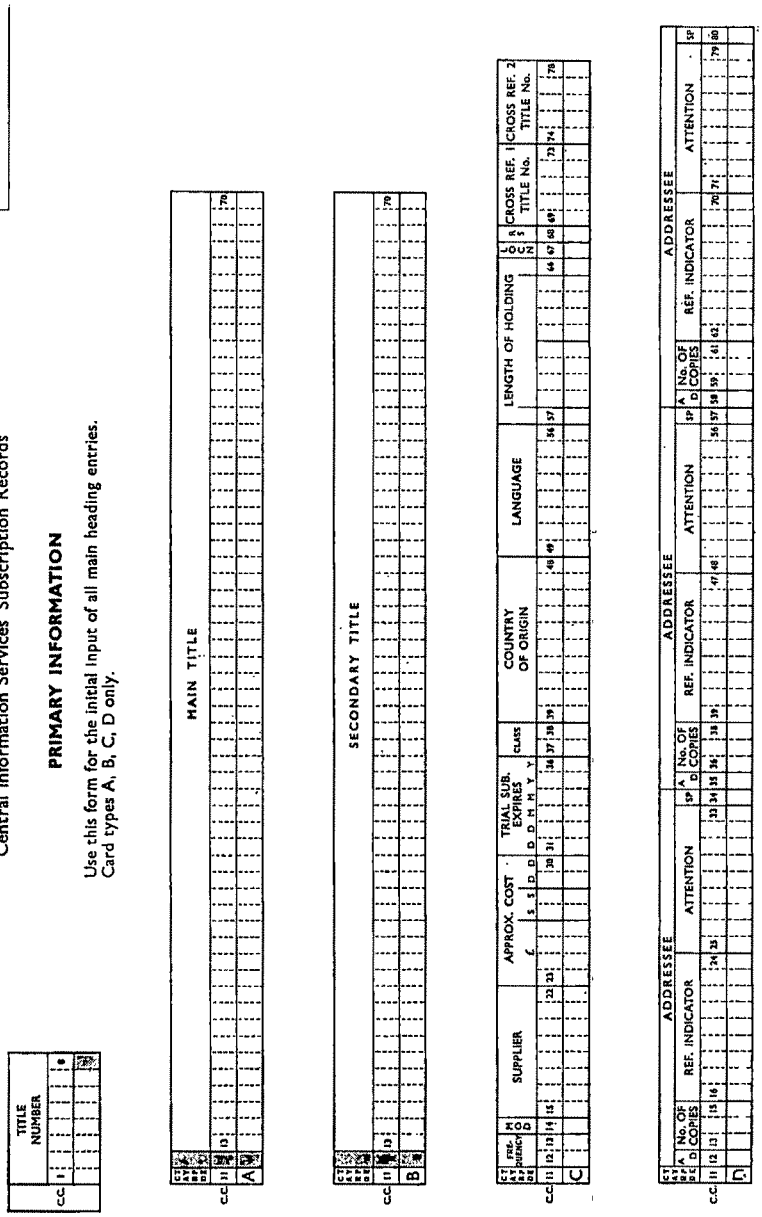

FIGURE 3

Central Information Services Subscription Records

ADDRESSEE INFORMATION

Use this form for adding or deleting direct subscription, circulation or reader service addressees under an existing main heading entry.
Card types M, N, O.

Ref. Punch Unit—Booking date cols.

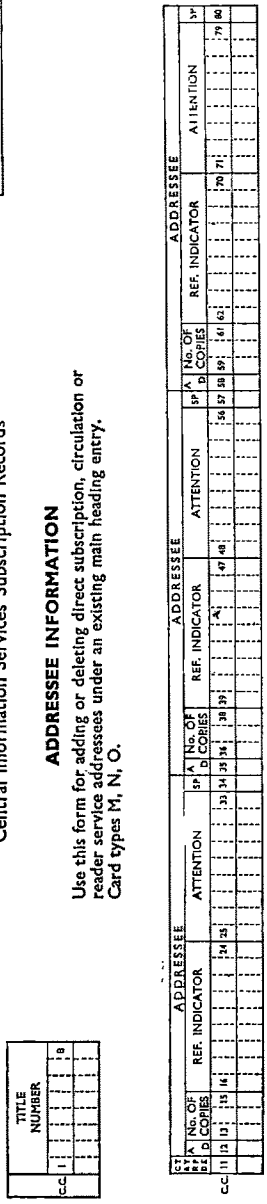

FIGURE 4

Central Information Services Subscription Records

SECONDARY HEADINGS

Use this form for amending the content of secondary headings (i.e; headings Incorporating a cross-reference). Card types P, Q.

Ref. Punch Unit—Booking date cols.

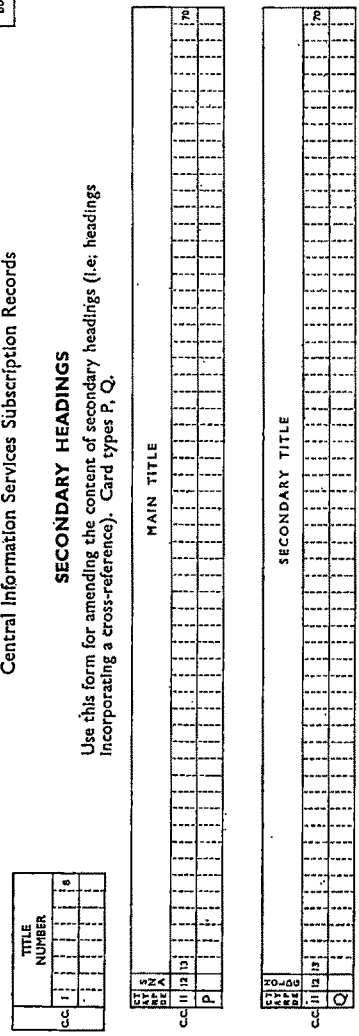

FIGURE 5

Central Information Services Subscription Records

PRIMARY INFORMATION

Use this form for amending information in an existing main heading entry. (But use buff addressee information form when addressee information only is to be amended.)
Card types J, K, L, M, N, O.

Ref. Punch Unit—Booking date cols.

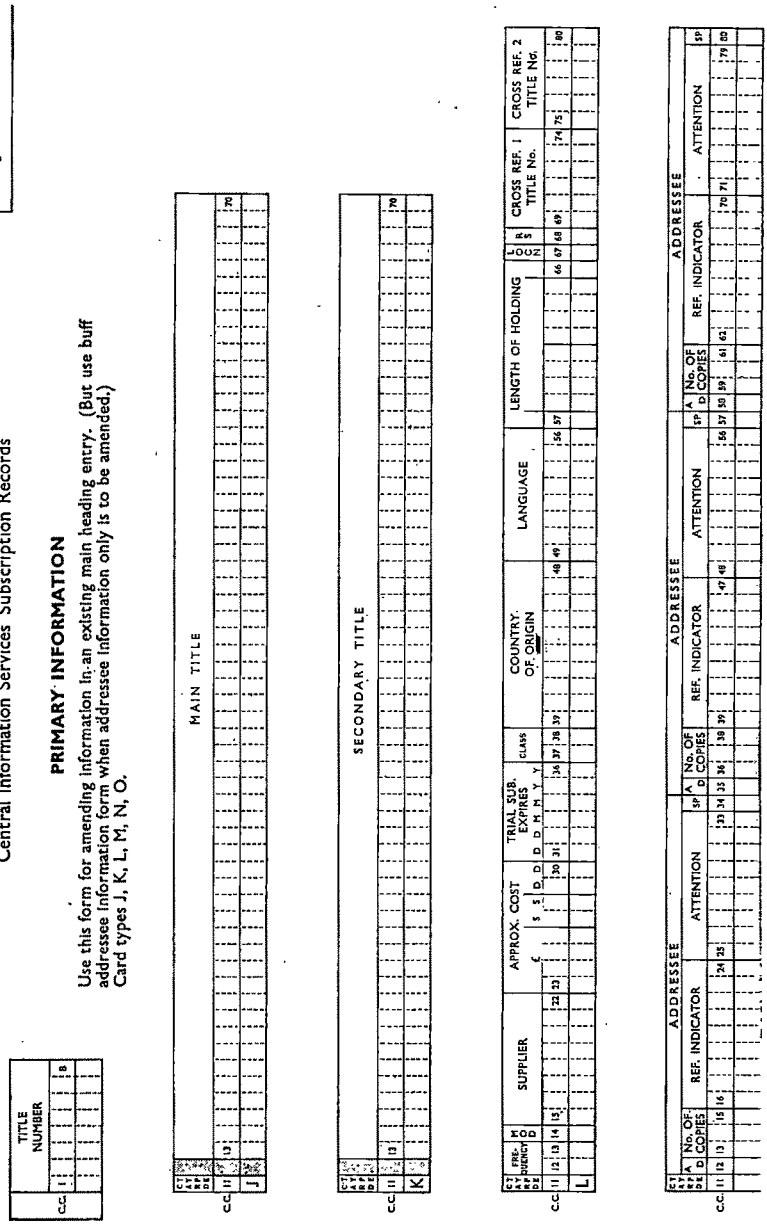

FIGURE 6

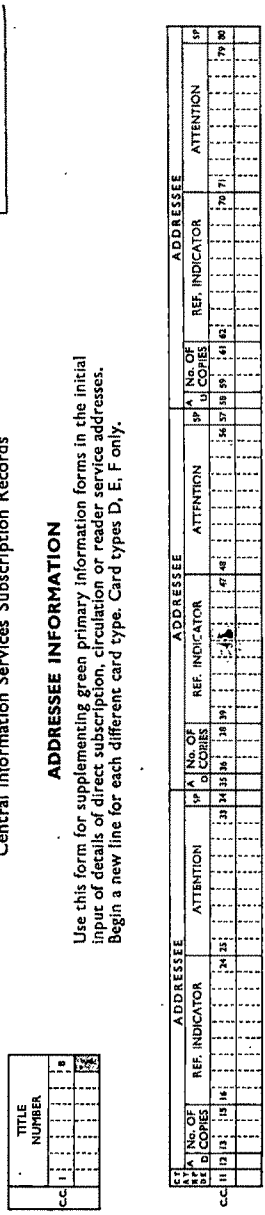

FIGURE 7

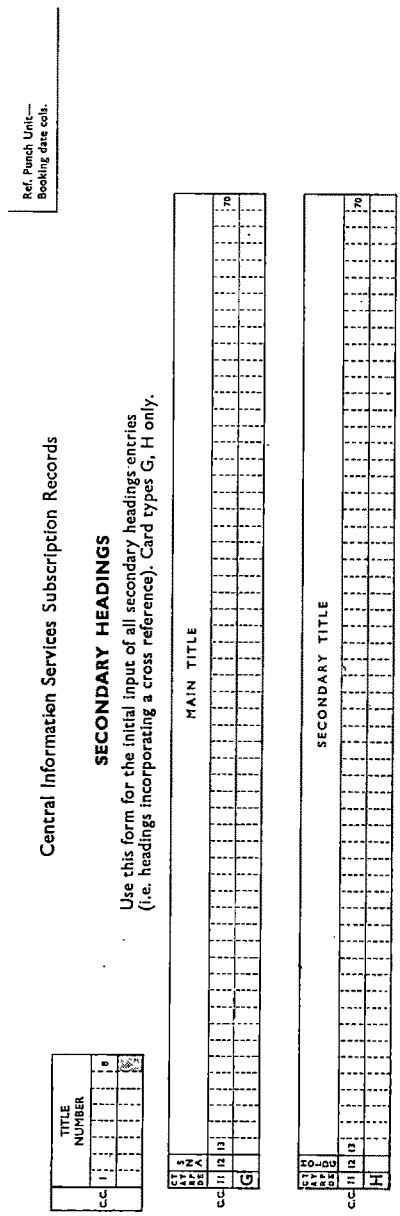

FIGURE 8

Central Information

DEL

Use this form for the deletion c
Card type Y deletes secondary headings. Card t

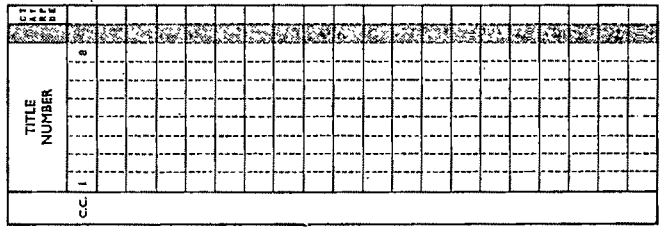

FIGURE 9

Central Information

REFERE

Use this form for all thr
The addition of each da
fields is a separate chan

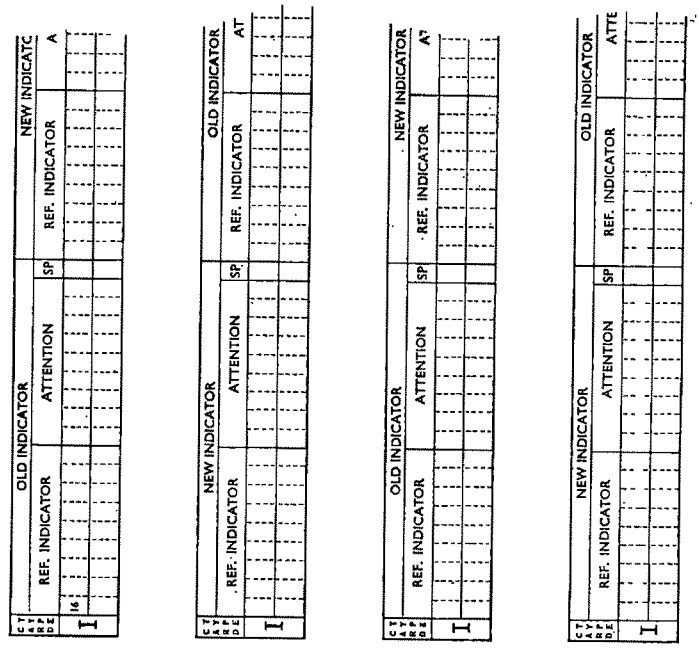

FIGURE 10

Letters to the Editor

DEVELOPING USER INDEPENDENCE

Dear Sir,

Since I was unfortunately unable to attend the 40th Annual Conference, I did not have the pleasure of supporting Dr Urquhart from the floor after he had presented his excellent paper 'Developing user independence' (*Aslib Proceedings,* December 1966, p. 351–6). May I therefore now be allowed to make one or two points?

To my mind there are relatively few information officers in industry who are serving basic research scientists, and when they do so they are able to act as information officers only if they are *solely* serving very small teams (usually about a dozen). Where such almost individual service cannot be afforded, the information service's main contribution to *this type* of research worker is, I suggest, by the provision of a first-class library and, as stressed by Dr Urquhart, by helping in the training of them to use a library to the maximum advantage. To say this, however, is only to stress what I have pointed out elsewhere (*Aslib Proceedings,* August 1964), namely that information officers working in such services have an increasingly important part to play in serving other scientific, technical and commercial staff.

I respectfully suggest, therefore, that industrial information officers who protest at Dr Urquhart's thesis should examine very carefully the depth of the information service they are each supplying, and the type of work, method of approach to it, etc., performed by the scientific and technical clientele they are serving. Some of these information officers will then realize that they are not serving basic research scientists, though they may have thought they were doing so; others will discover that, though such scientists are being served, the scale of provision of service is so small as to preclude the individual service I have mentioned.

There are, of course, those (and we in this ICI Division try to be in this category) who realize that as part of a reasonably large information service serving basic research workers (amongst others) they have to provide information officers to work as members of small research teams. Such officers are at the same time members of the main information service, in which other information officers serve the remaining scientific, technical and commercial staff on a broader but just as important front and one that requires the application of

just as many of the fundamental information skills. It must, however, be pointed out that unless a very careful watch on the situation is maintained, this system, owing to problems of communication, can give rise to feelings of isolation and to unprofitable duplication of effort.

Yours faithfully,

D. V. ARNOLD
Intelligence Section Manager
Techno-Commercial Department

Imperial Chemical Industries Ltd,
Heavy Organic Chemicals Division,
Organic House,
P.O. Box No. 2,
Billingham, Co Durham.
30th January 1967.

THE ORIGIN OF ASLIB

Dear Sir,

I think I should point out, for the record, the inconsistencies in the published accounts Dr Hutton has given from time to time about the origin of Aslib.

In the report of the first Conference, held at Hoddesdon in 1924, with which few current members of Aslib can be familiar, he gave an introductory address from the chair in which he said 'The conception of this Conference is, I believe, due to my friend Mr J. G. Pearce, and the somewhat onerous task of arranging the details has been taken up as a spare time occupation by my colleague Mr A. F. Ridley'. This statement, made when his recollection was sharpest, is correct. In his paper on the origin and history of Aslib in the first issue of the *Journal of Documentation,* June 1945, he attributes it to a small group, myself, himself and Mr A. F. Ridley, connected with the metallurgical research association.

Speaking of himself and A. F. Ridley in connection with the British Non-Ferrous Metals Research Association in his *Recollections of a Technologist* (Pitman 1964) he says (p. 162) 'As a result, we planned a week-end conference attended by some eighty invited delegates from libraries and industrial concerns. This was the start of ASLIB . . .' My name is not mentioned in this context, or elsewhere in the book as far as Aslib is concerned. This did not prevent me from reviewing it in generous terms for the technical press. In his 'Aslib past and future' marking his 90th birthday (*Aslib Proceedings,* vol. 19, no. 1, January 1967) he says 'Ridley suggested to J. G. Pearce and myself that we might run one of these ourselves' (i.e. a week-end conference).

It is relevant to add that I was Chairman, first of the Standing Committee and then of the Council of ASLIB from 1924 for some five years. The empty chair in the middle of the front row of the photograph taken of the Balliol Conference in 1925, is mute witness to my absence, on honeymoon. Early in that year, after the conception of the first Conference and before it took place,

I undertook as Director to establish the British Cast Iron Research Association, then four years old and in a precarious position. It was thus fortunate that Mr Ridley was able to contribute so much to the organization of the first Aslib Conference. The onerous responsibility of building up the BCIRA, combined with the death of my (first) wife in 1930, leaving me with two small children, compelled me to restrict various extra-mural activities, of which Aslib was one, and these were the sole reasons why I withdrew from Aslib.

I yield to no one in admiration for all that Dr Hutton has done for documentation in general and Aslib in particular, but feel that, although I have never claimed any particular credit for initiating Aslib, it is, if understandable, unfortunate that his recollection has become misty over such a long period. The success of Aslib has been a source of great satisfaction to me. Long may it continue.

JAMES G. PEARCE,
C.B.E., DR.ING., M.SC., M.I.MECH.E.,
M.I.E.E., F.INST.P., F.INST.M.

17 Abbey Road,
Harborne,
Birmingham 17
28th January 1967.

SELECTIONS FROM THE RECENT LITERATURE

ALL ITEMS listed may be borrowed from the Aslib Library, except those marked *, which may be consulted in the Library.

Books and Pamphlets

ARBEITSGEMEINSCHAFT DER SPEZIALBIBLIOTHEKEN
Bericht über die 10. Tagung in Düsseldorf, 31. März bis 2. April 1965. Kiel, 1966. 224 p.

BORDIN, RUTH B., *and* WARNER, ROBERT M.
The modern manuscript library. New York, The Scarecrow Press, 1966. 151 p, $4.00.

BOTTLE, R. T., *and* WYATT, H. V., *eds.*
The use of biological literature. London, Butterworths, 1966. ix, 286 p. 58*s*.

*The BRITISH universities annual: 1966, edited by Alan L. Binns. London, Association of University Teachers, 1966.

COLUMBIA UNIVERSITY. School of Library Service
Conference on the use of printed and audio-visual materials for instructional purposes, prepared by Maurice F. Tauber and Irlene Roemer Stephens, with the assistance of D. Marie Grieco and Richard J. Hyman. Title VII Project B 546, final report. New York, the School, 1966. xii, 234 p.

*COMPUTERS '66: an annual survey of the computer industry in Britain, ed. by R. F. Collin-Smith. Croydon, Surrey, Digest Data Books Ltd, 1966. 44,S29–S117 p. illus. A guide to manufacturers, bureaux, and users. 30*s*.

*CONFEDERATION OF BRITISH INDUSTRY
A review of mechanical engineering trade associations: a CBI staff report, published with the approval of a working party representative of the industry. London, C.B.I., 1966. Unpaged. 7*s* 6*d*.

CONFERENCE ON COMMUNICATION IN THE BIOLOGICAL SCIENCES, 14–15th December, 1966
Summaries of papers. London, Institute of Biology, 1966. 10 papers.

ENGINEERS JOINT COUNCIL
Rules for preparing and updating engineering thesauri. New York, Engineers Joint Council, 1965. 4 p.

FEDERATION INTERNATIONALE DE DOCUMENTATION. 31st meeting and congress, Washington, October 7–16, 1965
Proceedings . . . in cooperation with the American Documentation Institute, vol. II. Washington, Spartan; London, Macmillan, 1966. vii, 264 p. tables, diagrs.

FLANNERY, ANNE, *and* MACK, JAMES D.
Mechanized circulation system, Lehigh University Library. Bethlehem, Pa., Lehigh University. Center for the Information Sciences, 1966. 17 p., 4 append. (Library systems analysis. Report no. 4.)

FORUM OF SCIENTIFIC AND TECHNICAL INFORMATION ANALYSIS CENTER MANAGERS, DIRECTORS AND PROFESSIONAL ANALYSTS, Battelle Memorial Institute, Columbus Ohio, 1st, 9–11 November 1965
Proceedings. Columbus, Ohio, the Institute, 1965. 2 vols. tables, diagrs. $3.50.
vol. 1: proceedings.
vol. 2: directory of selected specialized information services.
Sponsored by Battelle Memorial Institute and United States Atomic Energy Commission.

*FOWLER, MAUREEN J.
Guides to scientific periodicals: annotated bibliography. London, Library Association, 1966. xvi, 318 p. 84*s* (63*s* to members).

FREEMAN, ROBERT R.
Modern approaches to the management of a classification. New York, American Institute of Physics, October 1966. iv, 29 [7] p. tables, diagrs. (AIP/UDC-3). Continuation of series AIP/DRP UDC 1 and 2. Presented at Seminar on UDC and Mechanization at the 32nd Conference of the International Federation for Documentation, The Hague, September 20 1966.

GOULD, S. H.
Manual for translators of mathematical Russian. Providence, Rhode Is., American Mathematical Society, 1966. 42 p. $3 00.

GREAT BRITAIN. Ministry of Technology. *National Lending Library*
A KWIC index to the English language abstracting and indexing publications currently being received by the National Lending Library. Boston Spa, the Library, 1966 39 p.

GURNEY, GENE
The Library of Congress: a picture story of the world's largest library. New York, Crown Publishers, 1966. 128 p., illus.

HENDERSON, MADELINE M., *and others*
Cooperation, convertibility, and compatibility among information systems: a literature review. Washington, National Bureau of Standards, 1966. iii, 140 p. (N.B.S. Misc. Publ. 276). $2.50.

HERNER, SAUL, *and others*
A recommended design for the United States

medical library and information system. Washington, D.C., Herner and Company, 1966. 2 vols. $11.00.
vol. 1: system design, implementation and costs.
vol. 2: background studies.

HOFFER, JOE R.
Manual for a hand-sort punch-card system for indexing social welfare publications. Columbus, Ohio, National Conference on Social Welfare, 1966. 81 p.

IVIE, EVAN LEON
Search procedures based on measures of relatedness between documents. Cambridge, Mass., Massachusetts Institute of Technology, 1966. [121] p. tables, diagrs. $6.00.

JUHASZ, S., *and* AMMINGER, O.
Critical abstracts. San Antonio, Texas, Southwest Research Institute, 1966. [12] p. illus., tables, diagrs. $1.00.

KERVEGANT, D.
Classification décimale universelle pour les sciences agricoles [UDC for the agricultural sciences]. Approuvée par la Fédération Internationale de Documentation comme FID Publ. 402. Paris, Institut National de la Recherche Agronomique, 1966. 162 p.

LOCKHEED MISSILES AND SPACE CO. Electronic Sciences Laboratory
Annual report: automatic indexing and abstracting. Part I, by B.D. Rudin. Palo Alto, Calif., Lockheed Missiles and Space Co., 1966, Various paging.

LOCKHEED MISSILES AND SPACE CO. Electronic Sciences Laboratory
Annual report: automatic indexing and abstracting. Part II: English indexing of Russian technical text, by H.R. Robison. Palo Alto, Calif., Lockheed Missiles and Space Co., 1966. Various paging.

*LONDON. University. *Institute of Advanced Legal Studies*
Union list of West European legal literature: publications held by libraries in Oxford, Cambridge and London. London, the Institute, 1966. viii, 426 p.

MARKS, MELVIN R.
Behavior-related research in information storage and retrieval. Rochester, New York, Rochester University, College of Business Administration, 1966. 51 [28] p.

OXFORD. University. *Committee on University Libraries*
Report. Oxford, University Press, 1966. 210 p. tables, diagrs. 15*s*. Chairman: R. Shackleton. Supplement No. 1 to *University Gazette,* vol. xcvii, November 1966.

REES, ALAN M., *and* SARACEVIC, TEFKO
The measurability of relevance. Cleveland, Ohio, Western Reserve University, Center for Documentation and Communication Research, 1966. 19 p. (Comparative Systems Laboratory Technical Report no. 7.)

REISNER, PHYLLIS
Evaluation of a "growing" thesaurus. New York, I.B.M. Watson Research Center, 1966. 19 p. tables.

SARACEVIC, TEFKO, *and* REES, ALAN M.
Towards the identification and control of variables in information retrieval experimentation. Cleveland, Ohio, Western Reserve University, Center for Documentation Communication Research, 1966. 17, [7] p. diagrs. (Comparative Systems Laboratory, Technical Report no. 6.)

*SOCMA [Synthetic Organic Chemical Manufacturers' Association] handbook [of] commercial organic chemical names. Washington, American Chemical Society, Chemical Abstracts Service, 1966. 666, 15, 64 p.

SYRACUSE UNIVERSITY. Research Institute.
A study of the frequency with which Russian, French and German scientific articles are cited in selected American scientific journals. New York, the University, 1966. [41] p. tables, diagrs. $6.00.

ULLMAN, HANS C.
Descriptor relationships. Santa Monica, California, System Development Corporation, 1965. 26 p.

ULLMANN, HANS C.
Indexing techniques. Santa Monica, California, System Development Corporation, 1966. 17 p.
Paper presented at the American University Center for Technology and Administration, Institute on Economics of Information Center Management, 8th Institute on Information Storage and Retrieval, 14 February 1966.

UNITED STATES. Defense Documentation Center. *Defense Supply Agency.*
DDC descriptor frequencies. Alexandria, Va., the Center, 1966. 49 p.

UNITED STATES. National Science Foundation
Basic research, applied research, and development in industry, 1964: a final report on a survey of R & D funds, 1964, and R & D scientists and engineers, January 1965. Washington, Govt. Printer, 1966. 122 p.

WESTERN RESERVE UNIVERSITY. Center for Documentation and Communication Research
A selected bibliography of documentation and information retrieval. [new rev. ed.]. Cleveland, Ohio, the Center, Autumn 1966. 12 p.

WOOD, ELIZABETH INGERMAN
Report on project history retrieval: tests and demonstrations of an optic-coincidence system of information retrieval for historical materials. Philadelphia, Pa., Drexel Institute of Technology, Graduate School of Library Science, 1966. xiii, 123 p. tables. (Drexel Library School Series, no. 14.) $3.00.

Articles and Papers

ATANASIU, PIA
Unele aspecte ale cercetarii in domeniul informarii. [Some considerations on information research.] *Studii si Cercetari de Documentare si Bibliologie*, vol.8, no.2, June 1966, p.143–61.

BALAY, ROBERT, *and* GARDNER, JOHN
An inexpensive information retrieval system using coordination of terms with edge-notched cards. *College and Research Libraries*, vol.27, no.6, November 1966, p.464–9.

BALNAVES, JOHN
Shared cataloguing. *Australian Library Journal*, vol.15, no.5, October 1966, p.196–9. Discusses developments in co-operative cataloguing by Library of Congress compared with Australian work.

BATTY, C. D.
Librarianship by degrees. *Library World*, vol.68, no.798, December 1966, p.155–60.

BECKER, JOSEPH
Communications networks for libraries. *Wilson Library Bulletin*, vol.41, no.4, December 1966, p.383–7.

BLUM, RUDOLF
Die maschinelle Herstellung der Deutschen Bibliographie in bibliothekarischer Sicht. [Mechanized production of the Deutsche Bibliographie from the librarian's point of view.] *Zeitschrift für Bibliothekswesen und Bibliographie*, vol.13, no.5/6, 1966, p.303–21.

BORROW, DANIEL G., *and others*
A computer-program system to facilitate the study of technical documents. *American Documentation*, vol.17, no.4, October 1966, p.186–9.

BRYAN, HARRISON
A first computer-printed catalogue for N.U. [Sydney University]. *Australian Library Journal*, vol.15, no.5, October 1966, p.200–1.

CAMARASESCU, RUXANDRA, *and others*
Indexarea coordonata si documentarea istorica. [Coordinate indexing and historical documentation.] *Studii si Cercetari de Documentare si Bibliologie*, vol.8, no.2, June 1966, p.175–80.

CAMPBELL, D. V., *and* SOUTHWELL, BRIAN
Data processing in Monash University Library. *Australian Library Journal*, vol.15, no.5, October 1966, p.176–80.

CARTER, LAUNOR F.
National document-handling systems in science and technology. *Science*, vol.154, no.3754, December 9, 1966, p.1299–1304. Review of COSATI study and further discussion.

COPELAND, ALICE T.
Philosophy journals as current book selection guides. *College and Research Libraries*, vol.27, no.6, November 1966, p.455–60. 13 philosophy journals studied for one year and the book reviews tabulated, to determine adequacy of review coverage.

DAWE, P.
Automation in C.S.I.R.O. libraries. *Australian Library Journal*, vol.15, no.5, October 1966, p.173–5.

DAY, MELVIN S.
Information processing in NASA's library. *Wilson Library Bulletin*, vol.41, no.4, December 1966, p.396–400, 438.

DEALE, H. VAIL
Librarianship in Iran. *College and Research Libraries*, vol.27, no.6, November 1966, p.461–3.

DICKISON, R. R.
The scholar and the future of microfilm. *American Documentation*, vol.17, no.4, October 1966, p.178–9.

DONALDSON, MARY JANE, *and* HARVEY, JOHN F.
Library school instructor evaluation. *College and Research Libraries*, vol.27, no.6, November 1966, p.464–9.

FIELD, F. BERNICE
The new catalogue code: the general principles and the major changes. *Library Resources and Technical Services*, vol.10, no.4, Fall 1966, p.421–36.

FREDERIKSEN, JOHS
Informationssøgning pa farmaceutiske artikler. [Information retrieval in pharmaceutical literature.] *Tidskrift för Dokumentation*, vol.22, no.4, 1966, p.50–4.

FUNCK, JACQUELINE, *and* MOUREAU, MAGDELEINE
Le traitement de l'information documentaire par ordinateur a l'Institut Français du Pétrole. [The handling of information by computer at the I.F.P.] *Bulletin des Bibliothèques de France*, vol.11, no.9/10, September–October 1966, p.335–47.

The FUTURE of library education in New Zealand. *New Zealand Libraries*, vol.29, no.9, October 1966, p.161–77.

GINGOLD, KURT
A translator's guide to better translations. *Special Libraries*, vol.57, no.9, November 1966, p.643–4.

GORDON, GALVY E.
Columbus' conversion to data processing. *Wilson Library Bulletin*, vol.41, no.4, December 1966, p.414–17. Mechanization at Columbus Public Library: payroll, acquisitions, standing orders, periodicals, book catalogues, registration, circulation, etc.

GORE, DANIEL
Further observations on the use of LC classification. *Library Resources and Technical Services*, vol.10, no.4, Fall 1966, p.519–24.

GROSCH, AUDREY N.
Special librarian's link to data processing. *Special Libraries*, vol.57, no.9, November

1966, p.635–40. Data processing equipment is capable of handling many clerical functions for special libraries and librarians should study applications and equipment.

GULL, C. D.
Structure of indexing authority lists. *Library Resources and Technical Services*, vol.10, no.4, Fall 1966, p.507–11.

GULLBERG, INGVAR E.
Some notes on dictionaries and dictionary-making with particular reference to conditions in Scandinavia. *Stechert-Hafner Book News*, vol.21, no.3, November 1966, p.33–5.

HAGE, ELIZABETH B.
Computer potential in Maryland [County Library]. *Wilson Library Bulletin*, vol.41, no.4, December 1966, p.401–3.

HAMMOND, HILARY
A punched card gramophone record catalogue at Luton Central Library. *Library World*, vol.68, no.798, December 1966, p.168.

HEALEY, JAMES S.
An automated library in New England. *Wilson Library Bulletin*, vol.41, no.4, December 1966, p.411–13. New Bedford (Mass.) Public Library: advocates co-operation in automation.

HERALDING a new electrostatic age? *Business Equipment Digest*, vol.6, no.12, December 1966, p.6–9. Survey of new electrostatic copiers available on British market.

HILLER, GARY
Nutzen wir die Informations-Explosion richtig [Are we using the information explosion correctly]? Reprinted from *Chemiker-Zeitung Chemische Apparatur*, vol.88, no.5, March 5, 1964, p.115–9.

IYENGAR, T. K. S.
Co-operative role of academic libraries in U.S.A. *Indian Librarian*, vol.21, no.2, September 1966, p.59–65.

KELLER, C. WARREN
Monsanto information center's audio-visual orientation program. *Special Libraries*, vol.57, no.9, November 1966, p.643–51. Introduction to the library using colour slides and a recorded sound track. Procedures for preparation are discussed.

KOLB, MARGARET C., *and others*
PICS: the pharmaceutical information control system of Merck Sharp and Dohme Research Laboratories. *American Documentation*, vol.17, no.4, October 1966, p.180–5.

KOZENKO, A. V., *and* POLOVINCHIK, A. N.
Otsenka effektivnosti informatsionnoi deyatel'nosti [An evaluation of the cost of information services]. *Nauchno-Tekhnicheskaya Informatsiya*, no.10, 1966, p.3–7.

LIBRARY co-operation for reference and research [special section; papers by] R. G. Vosper, E. B. Nyquist, M. V. Gaver, J. R. Hunt and K. E. Beasley. *ALA Bulletin*, vol.60, no.11, December 1966, p.1133–55.

LYNCH, MICHAEL F.
Computers in the library. *Nature*, vol.212, no.5069, December 24, 1966, p.1402–4.

MARKS, ERWIN
Nationale und internationale bibliothekarische Fachvereinigungen. [National and international library associations.] *Zentralblatt für Bibliothekswesen*, vol.80, no.11, 1966, p.641–59.

MASON, ELLSWORTH
Some advice to librarians on writing a building program. *Library Journal*, vol.91, no.21, December 1, 1966, p.5838–44.

OERTEL, DIETER
Der Aufbau zentraler Fachbibliotheken in der Bundesrepublik Deutschland. [Building up centralized special libraries in the Federal Republic of Germany.] *Zeitschrift für Bibliothekswesen und Bibliographie*, vol.13, no.5/6, 1966, p.322–30.

OH, TAI KEUN
New dimensions of management theory. *College and Research Libraries*, vol.27, no.6, November 1966, p.431–8. Emphasizes necessity of good organization and management in library operations; further research is required.

O'NEILL, EDWARD T.
Sampling university library collections. *College and Research Libraries*, vol.27, no.6, November 1966, p.450–4. Two sampling techniques for large collections; one based on locations and the second on the shelf-list.

OSTREM, WALTER M.
The Ruhr University Bochum Library. *Wilson Library Bulletin*, vol.41, no.4, December 1966, p.418–20.

OWEN, EDITH M.
Closed-circuit television in the library. *Education Libraries Bulletin*, no.27, Autumn 1966, p.24–7.

PERRY, STUART
New Zealand law libraries. *New Zealand Libraries*, vol.29, no.10, November 1966 p.189–94.

PIZER, IRWIN H.
Automation in the library. Copied from *Hospital Progress*, vol.47, no.7, July 1966, p.65–8, 70, 72. Use of computers with particular reference to MEDLARS.

REES, ALAN M.
Criteria for the operation of libraries and information retrieval systems. *Special Libraries*, vol.57, no.9, November 1966, p.641–2.

REICHARD, EDWIN W., *and* ORSAGH, THOMAS J.
Holdings and expenditures of U.S. academic libraries: an evaluative technique. *College and Research Libraries*, vol.27, no.6, November 1966, p.478–87.

ROSENTHAL, JOSEPH A.
The administrative implications of the new rules. *Library Resources and Technical Services*, vol.10, no.4, Fall 1966, p.437–44. Anglo-American Cataloguing Rules—new edition.

ROY, B. PAUL MOHAN
Indian book trade and the problems of acquisition. *Indian Librarian*, vol.21, no.2, September 1966, p.72–6.

SAGE, C. R.
Comprehensive dissemination of current literature. *American Documentation*, vol.17, no.4, October 1966, p.155–77.

SCHARLOO, W.
Half-mechanisch documenteren: tussen gisteren en morgen. [Semi-mechanized documentation.] *Tijdschrift voor Efficientie en Documentatie*, vol.36, no.13, December 1966, p.825–33.

SCHIEFLER, K.
Das neue Urheberrecht und seine Auswirkungen auf die Dokumentation. [The new copyright law in Western Germany and its effect on documentation.] *Nachrichten für Dokumentation*, vol.17, no.6, December 1966, p.204–7.

SEWELL, P. H.
Technical college libraries. *Library Association Record*, vol.68, no.12, December 1966, p.423–7.

The SHACKLETON report. [Review of Report of the Committee on University libraries (Oxford and Cambridge).] *Times Literary Supplement*, no.3379, December 1, 1966, p.1123.

SHAH, PRAVIN C.
How should you train tomorrow's librarians? *Indian Librarian*, vol.21, no.2, September 1966, p.66–71.

STEIN, GERTRAUD
Das Koordinierungszentrum für Aufbau, Einrichtung und technische Ausstattung der Bibliotheken bei der Staatsbibliothek der CSSR. [The Co-ordinating Centre for Library Building and Equipment at the State Library of Czechoslovakia.] *Zentralblatt für Bibliothekswesen*, vol.80, no.11, 1966, p.677–9.

STEWART, BRUCE W.
Data processing in an academic library. *Wilson Library Bulletin*, vol.41, no.4, December 1966, p.388–95. Computerized periodicals circulation and issue systems at Texas A & M University with other planned procedures.

SVIRIDOV, FELIX A.
Das "All-Unions-Institut für wissenschaftliche und technische Information der Akademie der Wissenschaften der USSR" (VINITI)—Aufgaben und Tätigkeiten [duties and functions]. *Nachrichten für Dokumentation*, vol.17, no.6, December 1966, p.197–203.

TAPPER, COLIN
Retrieving legal information. *Data Processing*, vol.8, no.6, Nov.–Dec. 1966, p.313–17. Work being done on computerized retrieval systems for legal information, with an OSTI grant.

TAYLOR, RON
Corporate authorship and cultural evolution. *Library Resources and Technical Services*, vol.10, no.4, Fall 1966, p.451–4. Anglo-American Cataloguing Rules—new edition.

TELL, BJORN V., *and* PONTEUS, A.
ADB av en tidskriftssamförteckning [Automatic Data Processing of a union list of periodicals.] *Tidskrift för Dokumentation*, vol.22, no.4, 1966, p.55–9.

TITUS, JAMES P.
The computer as a threat to personal privacy. *Communications of the ACM*, vol.9, no.11, November 1966, p.824.

VAN BUREN, MARTIN
A guide to the preparation of furniture specifications and bidding documents. *Library Journal*, vol.91, no.21, December 1, 1966, p.5845–50.

VAN DER SELLEN, LIANA
Italian cataloguing rules. *Library Resources and Technical Services*, vol.10, no.4, Fall 1966, p.499–504.

VOICULESCU, MONICA
Utilizarea masinilor cu fise perforate la realizarea unui index alfabetic de subiecte. [Utilization of punched-cards machines in setting up an alphabetical subject-heading index.] *Studii si Cercetari de Documentare si Bibliologie*, vol.8, no.2, June 1966, p.171–4.

WAHLIN, EJNAR
Classification systems and their subjects: a general analysis of different kinds of classification systems characterized by different types of subject. *American Documentation*, vol.17, no.4, October 1966, p.199–205.

WEBER, DAVID C.
Design for a microtext reading-room. *Unesco Bulletin for Libraries*, vol.20, no.6, November–December 1966, p.303–8.

WEIDNER, MARY K.
Decatur: pioneer in data processing. *Wilson Library Bulletin*, vol.41, no.4, December 1966, p.409–10. Decatur (Illinois) Public Library electronic data processing system: started in 1959.

WEINSTEIN, S. JANE
Biological dictionary preparation, control and maintenance. *American Documentation*, vol.17, no.4, October 1966, p.190–8.

WHITE, BRENDA
The SfB system: classification for the building industry. *Library Association Record*, vol.68, no.12, December 1966, p.428–32.

WHITE, HERBERT S.
To the barricades! The computers are coming! *Special Libraries*, vol.57, no.9, November 1966, p.631–5. Use of computers in library ventures, information services and SDI.

WISSMANN, FRIEDBERT
Aufbau eines Schlagwort-Kataloges für die Verwendung von Sichtlochkarten in einer Fach-Dokumentation. [Compilation of keyword list for the use of feature cards in subject documentation.] *Dokumentation Fachbibliothek Werksbücherei*, vol.15, no.2, December 1966, p.39–43.

ZWILLENBERG, H. J.
Automation in action: other aspects. *Australian Library Journal*, vol.15, no.5, October 1966, p.181–5. Comment on article by H. Bryan in issue, vol.15, no.1, 1966, p.127.

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At the Central Engineering Establishment, Burton-on-Trent, the librarian will be required to provide first-class coverage of mining techniques throughout the world and to exploit this to the full by means of abstracts, etc.

The Doncaster library serves a wide stratum of technical, scientific and professional staff.

Candidates for both posts must be at least Associates of the Library Association and for preference should have had experience in a special library.

The appointments are superannuable, and salary according to qualifications and experience will be within the scale £1,095–£1,385.

Please write with full details of education and experience to date to the Headquarters Staff Manager, National Coal Board, Hobart House, Grosvenor Place, London SW1, indicating for which post you wish to apply.

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Applications stating qualifications, experience and age should be forwarded to the above address.

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Applications are invited from men or women for the position of Assistant Information Officer/Librarian at the Company's Technical Centre, St. Neots.

The Laboratory, established in 1963, forms part of the Overseas Chemical Division of W. R. Grace & Co., New York, and is concerned with research, development and application of new compounds based on rubbers, resins and plastics and the development of other chemical specialities.

This vacancy would appeal to persons with experience in a laboratory and some knowledge of technical phraseology. While a scientific background in rubbers, resins and plastics, and experience of technical library work are desirable qualifications, applications from candidates showing interest in information work would be seriously considered and training offered. The successful candidate would ultimately assume full responsibility for the general library and information services. Knowledge of foreign languages is advantageous but not essential.

Apply with details of age, education, qualifications and experience to:

Miss B. A. Wallis,
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As a result of the increase in demand for technical information there are now further openings for Information Scientists in our expanding and dynamic Information Centre.
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A basic knowledge of medicine or a degree in a medical or biological science is essential and an interest in the use of computers in the solution of the scientific problems of therapeutic research is also desireable. Candidates must have a good reading knowledge of one or more foreign languages. In all cases they must possess, or be willing to acquire, a working knowledge of German.

Careful introductory training into this challenging field of work will be given and medical staff is available in an advisory capacity. The latest aids to data processing form an integral part of the system.

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Applicants should write, enclosing initially brief personal details to:

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and

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Mrs Winifred Tucker,
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The Director of Research,
Manganese Bronze Group Research,
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The

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Translators

A number of translators-not over the age of 40-are required to work in **BASLE, SWITZERLAND,** to translate into English medical and scientific publications and reports on Geigy pharmaceutical products.

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Whilst some medical knowledge is desirable the positions are open to scientists or linguists wishing to enter new fields.

Conditions of service are in keeping with the Company's international reputation and generous assistance with expenses associated with re-location in Switzerland will be offered in appropriate cases.

Applicants should write, enclosing initially brief personal details to:

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ASLIB CALENDAR 1967

March

FRI.31.	Scottish Branch annual general meeting and conference, David Hume Tower, University of Edinburgh, 10 a.m.
FRI.31 – SUN.2.	Aeronautical Group annual conference, College of Aeronautics, Cranfield.

April

MON.3 – FRI.7.	International Conference on Education for Scientific Information Work.
MON.3 – WED.5.	Repeat of Chemical Group course in Basic Chemistry for non-chemists. Shell Industrial Chemicals Laboratory, Egham.
WED.5.	First Aslib Annual Lecture, The Royal Institution, 6 p.m.
MON.10 – WED.12.	Further repeat of Chemical Group course in basic chemistry for non-chemists.
FRI.14 – SUN.16.	Transport Group conference at Leicester University.
FRI.21.	Computer Teach-in at Imperial College. (See paragraph below.)

May

MON.15 – WED.17.	Chemical Group conference at Attingham, near Shrewsbury.
WED.17.	Evening meeting.

June

FRI.16 – SUN.18.	Electronics Group annual conference, Ashridge House, Berkhamsted.

October

MON.9 – THU.12.	41st Annual Conference at Harrogate.
THU.18.	Technical Translation Group. 'International Advertising', by P. A. Clifton.

Scottish Branch AGM/Conference

The Scottish Branch Annual General Meeting and Conference will be held in the Hume Tower, University of Edinburgh, George Square, on Friday 31st March 1967, from 10 a.m. until 5 p.m. During the morning session Mr F. N. Hogg, DPA, FLA, Principal, School of Librarianship, Aberystwyth, and Mr W. E. Tyler, FLA, Director, Department of Librarianship, University of Strathclyde, will speak on aspects of library education.

Following lunch at the Carlton Hotel, Mr W. Barr, OBE, ARTC, FIM, Consultant, Colvilles Ltd, will speak on 'Coping with the literature and Dr Douglas Guthrie, FRCPE, FRCSE, will initiate, with a short paper, a discussion on 'Learned society libraries—their scope and value'.

Further particulars may be obtained from the Branch Honorary Secretary, Mr W. H. Rutherford, The Royal Society of Edinburgh, 22 George Street, Edinburgh 2.

Aslib Co-ordinate Indexing Group

This Group recently completed its first year of existence, a year which included four successful evening meetings and the start of a research project.

The Committee this year consists of Dr W. E. Batten (Chairman), Mr G. M. Boyd, Mr H. F. Danvers, Mr A. D. Gilchrist (Secretary), Mr J. L. Jolley (Vice-Chairman), Mr R. Snel and Mr B. J. S. Williams.

The Committee feels that the present membership figure of sixty does not reflect the total number of Aslib members who are actively engaged in the use of this indexing technique. The Group will be a success only if it represents as wide a spectrum of knowledge and experience as possible. Members interested in joining should write to the Group Secretary, Research Department, Aslib.

Computer teach-in

On Friday 21st April 1967 a teach-in for computer specialists and documentalists is being held at Imperial College, Exhibition Road, London SW7 This is being arranged jointly by Aslib and the British Computer Society, Information Retrieval Specialist Group. In the morning there will be talks by three documentalists: Mr B. C. Vickery, Head of Research Department at Aslib, on the organization of documents and information for use, the need for human analysis, and essential steps for both manual and mechanized systems; Dr A. K. Kent, Director of the Chemical Society Research Unit in Information Dissemination and Retrieval, on comparison of the philosophy of indexing text with that of indexing structural formulae; and Dr W. E. Batten, Imperial Chemical Industries Limited, on co-ordinate indexing and mechanization. In the afternoon there will be further papers, given by 'software' specialists: Miss H. M. Townley, International Publishing Corporation, on the use of the computer in information work (what a computer can do; what sort of relationship can be shown by computer; how much manual work is required; what sort of programs are needed for file organization, look-up systems, etc.) and Mr Charles E. Harding of Standard Telephones and Cables Ltd on programming (methods of computation, input and output media, visual display systems

applicable to information retrieval—drawing all examples from documentation). Further particulars and application forms may be obtained *up to 7th April* 1967 from: The Meetings Organizer, Aslib, 3 Belgrave Square, London, SW1. Telephone BELgravia 5050.

IATUL Seminar, 1967

The second IATUL Seminar on the application of international library methods and techniques will be held at the Delft Technological Library from Monday 4th to Saturday 9th September 1967 under the direction of Dr L. J. van der Wolk. The number of participants will be twenty-five and the fee will be 400 guilders. All correspondence should be directed to Miss C. D. Wilson, c/o Library, Technological University, 101 Doelenstraat, Delft, Netherlands.

Co-ordinate Indexing course

J. L. Jolley and Partners Ltd are setting up a series of two-day study courses, each course being self-contained, on *Classification for co-ordinate indexing systems.* Special attention will be paid to the building of keyword lists, the behaviour of codes and subcodes, and the structure of 'holothemic' or pattern-of-meaning classifications for handling subject matter.

Inquiries should be made to J. L. Jolley and Partners Ltd at Westbourne House, Westbourne Street, High Wycombe, Bucks.

World of Learning 1966-7

The latest edition of the *World of Learning* is the seventeenth to appear and once more contains additional information in some categories. The systematic classification for learned societies and research institutes, last year applied for the first time to some countries, has been used for several more in the new edition. Additional information has been included in many of the university entries; principal languages of instruction for a few of them are noted when these are not immediately obvious.

In the section dealing with Great Britain the usual list of 'Universities and University Colleges' remains, but a separate group has appeared in the latest edition headed 'Technological Universities'—although a note beneath this title explains that it is not the official designation for the recently promoted Colleges of Advanced Technology.

The information on the USSR has been considerably expanded: the names and purposes of many more societies and institutes have been included and the section covering 'Other Higher and Educational Research Institutes' now lists, for most of the entries, the subjects of the departments, and sometimes gives the size of the institute's library.

Computer language study

Many scientists find that with a rudimentary knowledge of French they can extract a considerable amount of information from articles in that language. The same is far from true of Russian, although the latter's importance in scientific literature is considerably greater.

In an attempt to remedy this situation, OSTI is making a grant of £12,460 to the University of Essex for the development of a new method of learning to read foreign languages, concentrating initially on Russian physics literature. The method is based on the selection by computer of the most frequently recurring items in the language used by different sections of the community (e.g. physicists, mathematicians) and on learning procedures derived from experimental psychology.

The study will also be extended to methods of improving the reading of French and German by those who have learned a little at school, and to the language problems of librarians and information officers. The director of the project is Professor P. D. Stevens.

The University of Essex is already making an analysis by computer of spoken and written Russian under a grant from the Nuffield Foundation.

Goldsmiths' Librarian

Mr D. T. Richnell, BA, Librarian of Reading University, has been appointed Goldsmiths' Librarian, University of London Library, from 1st August.

Dr R. S. Schultze

Another well-known figure in the special library world and a staunch supporter of Aslib for over twenty years has retired from full-time work. He is Dr R. S. Schultze who had been employed by Kodak Limited since 1938. Schultze was one of those courageous people whose opposition to the Nazi regime led him to choose exile rather than live under it, and England benefited royally from the choice as his many talents found expression in a variety of fields in his adopted country.

Schultze, a physical chemist, had worked at the Technical Universities of Brunswick and Hannover and at the University of Frankfurt–am–Main. He had also been Librarian and Editor of the German Society of Glass Technology at Frankfurt–am–Main. When he came to England he joined the Kodak Research Laboratory as its Librarian in November 1938, and was later appointed Group Leader of the Library and Information Group. The history of photography was, and still is, one of his special interests and in 1953 he was released from other work for a year to serve as Honorary Secretary of the Royal Photographic Society's Centenary Conference; he also edited the conference proceedings, published in 1955. He is, incidentally, a Fellow of the Society and its Honorary Librarian.

Doubtless these same interests led to his being appointed Curator of the Kodak Museum in the mid-1950's while still acting as Group Leader. In December 1963 he became full-time Curator until his retirement on 1st February 1967. One honour has always given him special pleasure, not only in the sense of personal recognition. In 1961 he was awarded the Gold Medal of the Austrian Photographic Society for 'meritorious services in the literature of photography'. This must be one of the rare occasions when information activities have been formally honoured by a scientific society.

Aslib has had the benefit of Dr Schultze's services in many capacities—as a member of Council from 1949 to 1956, of the Executive Committee from 1948 to 1951 and of the Publications and International Relations Committees at various times between 1944 and 1956. His enthusiasm for the job in hand, his insistence on minute attention to the accuracy of every detail and, no less, his tremendous zest for debate have all played a part in aspects of Aslib's growth. In one particular field, the development of photographic and documentation standards, he continues to give sterling service to both the British Standards Institution and the International Standards Organization, and it is understood that Kodak are retaining his services as a consultant on standardization work. It is hoped that he will also continue to represent Aslib on BSI committees. It is safe to say of Dr Schultze, perhaps more than of most people, that retirement is likely to be no more than the exchange of one busy mode of life for another. We hope that his new activities will continue to leave time for his Aslib associations to flourish.

NEW MEMBERS

CORPORATE

Name	*Locality*	*Representative*
Ashe Laboratories Ltd	Surrey	N. B. C. Gretton
Astra, Aktiebolaget	Sweden	S. Wiedling
AUDELF (Association des universites partiellement ou entierement de langue francaise)	Canada	J.M. Leger
Board for Information & National Tests in Youth & Community Service	Edinburgh	A. T. Rees
Brazil. Instituto Nacional de Pesquisas de Amazonia	Brazil	Miss M. J. Ferrerira
A. E. Cawkell	Middlesex	
British Oxygen Co Ltd	London	Miss M. Brown
Ceramics, Glass & Mineral Products Industry Training Board	Middlesex	Miss S. K. Pratt
Chile. Universidad Catolica de Chile	Chile	Miss M. T. Sanz
Cobb Breeding Co Ltd	Essex	E. T. Cantle
Colgate-Palmolive Ltd	London	R. C. Clay
Construction Industry Training Board	London	W. C. King
Debeham, Tweson & Chinnocks	London	G. A. T. Turnbull
Design Research Unit	London	R. Bridgman
Dunfermline College of Physical Education	Edinburgh	Miss M. A. Noble
El Salvador. Biblioteca Universitarie	El Salvador	Miss J. F. de Criado
Entreprise de Recherches et d'Activites Petrolieres	France	P. Y. Pignot
First National City Bank	London	R. A. Edgecliffe-Johnson
H.M. Prison Service Staff College	Yorkshire	Miss C. Kelly
Industrial Reorganization Corporation	London	C. A. Hogg
International Printers Ltd	London	R. A. L. Butcher
Kiwi Polish Co (Pty) Ltd	London	Dr H. S. B. Marshall
Mansell Information/Publishing Ltd	London	J. Commander
Maryland. University of Maryland	USA	A. M. Turner
Molecular Metals Ltd	Yorkshire	Miss J. C. Rowland
Mount Isa Mines Ltd	Australia	Mrs G. Kirwan
National Computing Centre	Manchester	D. R. Judd
Rand Mines Ltd	South Africa	Miss A. Louw

Name	*Locality*	*Representative*
Rendel Palmer & Tritton	London	S. T. Birch
Scientific & Technical Research Council of Turkey	Turkey	D. Eric
Setpoint Ltd	London	S. R. Greener
Antonius Ziekenhuis	Netherlands	L. P. de Jong
Strathclyde, Department of Librarianship, University of Strathclyde	Glasgow	C. Smith
Trinidad. Industrial Court of Trinidad & Tobago	Trinidad	Mrs A. M. Solomon
Vitramon Laboratories Ltd	Buckinghamshire	R. T. Sparkes
J. Whitaker & Sons Ltd	London	J. W. Coates
Yorkshire Imperial Metals Ltd	Leeds	Mrs P. Roughan

INDIVIDUAL

Name	*Locality*
Astall, H. R.	Staffordshire
Bhattacharyya, K.	London
Burrows, R. D.	London
Downing, J. C.	London
Fodor, M.	London
Ford, G.	Co Durham
Harrison, Miss H. P.	Middlesex
Hayes, E.	Middlesex
Holliday, Miss C.	Middlesex
Hughes, R.	Manchester
Hutchison, Miss B. G.	Birmingham
Lattimore, Miss M.	Cardiganshire
Laycock, D. A.	Yorkshire
Lloyd, Miss J. M.	London
Marks, Mrs J.	Berkshire
Marsland, Mrs E. M.	Canada
Montgomery, A. C.	Bristol
Newman, W. D.	Essex
Richardson, C. T.	Lincolnshire
Ruskin, J.	London
Scharloo, W.	Netherlands
Scutt, R. A.	London
Semere, Mrs E.	London
Smith, F. H.	Surrey
Stone, E. R.	Surrey
Stowe, Miss G.	Merioneth, North Wales
Wilcox, Miss M. P.	London
Williams, Miss D. R.	London

FAIR (FAST ACCESS INFORMATION RETRIEVAL) PROJECT; AIMS AND METHODS

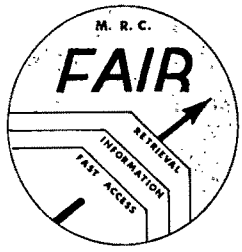
A. G. A. PICKFORD, GRAD.I.E.R.E., A.M.I.NUC.E., A.I.INF.SC.
National Institute for Medical Research (Hampstead Laboratories)

Paper presented to the Co-ordinate Indexing Group, Thursday 17th November 1966

Introduction

I am going to describe in general terms a research project which has been established to explore some of the problems of the use of the literature, particularly in the field of Biomedical Engineering. Work started on 13th September 1965 in the Division of Biomedical Engineering of the National Institute for Medical Research (Hampstead Laboratories). The project is scheduled to last for three years, and like most research, consists of a number of overlapping stages. We have reached the stage now of having acquired sufficient equipment and data to start trying out some of our ideas.

From the outset, the project has had to have publicity awareness in order to attract collaboration by potential users, and so a distinctive emblem was designed:



It shows three feature cards with optical coincidence, whose titles make up the phrase describing the philosophy of the experiment. For convenience the acronym FAIR has been made the name of the project. The Office for Scientific and Technical Information of the Department of Education and Science was consulted about the work and the Medical Research Council is financing it.

Definitions of Terms

I have already used a term, Biomedical Engineering, which may be strange to some of you, and so I would like to define some of the terms I shall be using. ('When I use a word,' Humpty-Dumpty said, 'it means just what I choose it to mean—neither more nor less.'—Lewis Carroll.)

It is usually understood that a vocabulary is a list of words in a language, with their definitions; that a language is a vocabulary and its usage; that to retrieve is to recover by investigation; and that information is items of knowledge; therefore I would like to define an *Information Retrieval Language* as a vocabulary and rules for its use in the recovery of information. It is one of the things, like other complex lexicons such as dictionaries and encyclopedias, that are covered by the class word, thesaurus. In the context of FAIR I would like you to understand the word *Thesaurus* as being a sophisticated information retrieval language and including a glossary, special groupings of the words, rules for their use, definitions of them and possibly other information. I shall use the word *Descriptors* to mean words or phrases which describe some concept which has been indexed. Descriptors are likely to become keywords in a thesaurus.

An *Ingredient* is a component of a mixture and a *Recipe* is a statement of ingredients, plus the procedure for preparing or assembling them. (Usually into a dish!) I will use the word recipe in an analogy. Other terms I use will be self-explanatory in the text except for *Biomedical Engineering*. This subject, often called Bioengineering or Biological Engineering, covers topics generated by the application of any engineering technique to Biology, and two major subdivisions are Medical Electronics and Biomechanics. Some of the topics included in Biomedical Engineering are:

1 Instrumentation for physiological measurements.
2 The application of stimuli to biological systems, such topics as heart pacing.
3 The analysis of biological material, for instance, 'breathalysers'.
4 The processing of biological data.
5 The presentation and interpretation of biological data, e.g. machine-to-man communications.
6 New surgical devices.
7 Life support systems, including systems like space suits.
8 Treatment of biological material, such as diathermy.
9 Properties of materials of interest to bioengineers.
10 Prosthetics.

The philosophical concepts of FAIR

The emphasis throughout the experiment is on rapid follow-up to an idea or query. So often, when a scientist has an idea, an engineer has a question, or a technician needs information, the time taken to find some relevant literature is so long that the interest in the idea or problem decays away to nothing. I think that there is a serious wastage down an 'ideas drain' which could be cut down by the facility of a quickly accessible, large collection of literature in the

worker's own subject field. We think that one way of achieving an economically viable on-desk library is to use microfiche and a feature card index. This would not only answer questions in his field, but would act as an ideas-generating machine. More will be said later about the actual embodiment of this idea of an on-desk library. The important point here is that with it, access to relevant literature is fast.

Of course, any information retrieval system is very largely dependent for its efficiency of operation on a good information retrieval language. One has only to consider the bulk of literature on thesaurus compilation, structuring, etc., to realize how well appreciated this point is. We hope to add our own contribution to these studies. We think that there is a way of compiling an information retrieval language regardless of subject without performing the intuitive tasks that nowadays have to suffice. To put it another way, we think we have a 'recipe' for producing information retrieval languages which is non-intuitive and largely mechanized, using a computer or electronic data processing equipment. This process will be described later.

Since we were assured of the co-operation of the Biological Engineering Society from the outset, the subject field of Biological Engineering has been chosen for the 'recipe' test. All the documents collected for the project are on some aspect of Biological Engineering. If our 'recipe' works in this interdisciplinary field, it should work for most subject fields. The question of size of subject field is relevant to this point—the size of the subject field envisaged as being suitable for the application of our techniques is a subject field for which an information retrieval language of up to one thousand descriptors (of average value of specificity to need an average of about eight descriptors per document) would be adequate. If more than one thousand descriptors of this degree of specificity (or average power of discrimination) are needed, it is probable that the subject field ought to be sub-divided.

Eventually a series of information retrieval systems in a wide variety of subjects could be set up. A typical subject field would be the range of interests of members of a learned society, or a division of a research institute. There is no reason why one central library should not service several specialized satellite library systems. The financing of such a set-up would probably be on the basis of an organization subscribing to as many of the satellite libraries as it wished, down to the level of one per individual if needed.

Aims and methods

Aim 1: *To produce a formula for creating efficient indexes to feature card information retrieval systems*

The compilation of an information retrieval language is usually done by a professional indexer and many different approaches can be made. One popular way is to start indexing a pile of documents in the particular field and to simply create descriptors as you go along, usually with provision for an attempt at rationalization every so often. Another way is to note descriptors from a representative collection of literature, sort them out into some sort of logical structure, then start indexing. These, and other systems like them work, but how well? It is often difficult to know or measure the efficiency even after

many years of operation. Happily, information retrieval languages are 'open-ended' and however they are compiled, there has to be provision for updating, revision and editing.

As far as the compilation time is concerned, I have heard of information retrieval languages being compiled in as short a time as eight man-weeks and as long a time as two man-years.

Two generalizations about information retrieval language creation can be made with safety:

1 A representative cross-section of documents in the field is a great help.
2 Consultation with users as to the type of descriptors they use to ask questions is very important.

Method 1

A collection of Biomedical Engineering literature was started, the judgment of what should be included being based on the experience of the members of the Division of Biomedical Engineering. To make sure that the sample was a representative cross-section of the field, all potential collaborators were invited to donate examples of their idea of Biomedical Engineering. Following the letter of invitation to all members of the Biological Engineering Society (BES), a letter giving details of exactly what was required of them was sent. Both letters were full and explanatory in nature. Great keenness was shown by some of the members of the Hospital Physicists Association (HPA), and since the subject fields of the two societies overlapped to some extent, they too were invited to join. It was explained, however, that the definitions of the subject area of Biomedical Engineering would have to remain, which explains the relatively poor response from the HPA.

The tables below show the results of the appeal for collaborators and literature samples (A) and literature collection (B):

TABLE A. COLLABORATORS

	BES	HPA	Others
Invitations to join	255	350*	33†
Replies	145	43	23
Descriptor allocators	120	36	22
Supplied reprints	92	8	4
Unable to help	25	7	1

Total number of full participants = 178

* (Approx.). † (8 for interest only).

TABLE B. LITERATURE COLLECTION

(Fourteen months: September 1965–November 1966)

Library reprints	1,488
BES donations	506
HPA donations	47
Language generation	1,216

Total number of different journals = 220

The strategy of literature collection was to get a representative cross-section of the field rather than *all* the literature. An interesting observation from Table B is that so few as 1,488 articles should have come from as many as 220 different journals. This number of articles includes some that were reports, book chapters, pamphlets, or other non-journal sources. This highlights one of the greatest problems in Biomedical Engineering—keeping up with the scattered literature.

Author (including co-authors) and Accession Number indexes have been compiled as the collection has grown, and collaborators have been invited to use them.

The collection is in the form of reprints (originals and Xerox 914 copies) which is necessary to facilitate their circulation to the collaborators. Batches of four reprints (an arbitrary number and a convenient batch size) are sent out to have descriptors allocated to them, without restriction or discipline other than certain grammatical rules (see Appendixes 1 and 2). The most important of these is the putting of the descriptors into order of importance. Reprints are chosen to match each collaborator's speciality (we keep a subject profile of each collaborator).

TABLE C. REPRINT CIRCULATION

	Number of collaborators who have:	
	Received	Returned
First batch	176	151
Second batch	147	112
Third batch	67	36

Every reprint is circulated twice so that comparisons can be made between two different individual's attempts, and so that information retrieval languages from both circulations can be compared.

	Number of reprints circulated	
	Sent out	Returned
First time	967	789
Second time	592	405

Table C shows how the circulation of reprints is going. The descriptors which our collaborators use are the data we are going to process into an information retrieval language. Every descriptor is edited for grammar, spelling, etc., and then punched on to an eighty-column (computer input) card. Each descriptor is *also* punched on to an eighty-column card *before* editing because we are also exploring the possibility of cutting out the editing step. Both the edited and unedited sets of cards will be processed.

Table D shows how the editing is going, and how many punched cards are produced for the given number of lists.

TABLE D. EDITING AND PUNCHED CARD PRODUCTION

	Number of lists	Number of cards produced	Average descriptors per paper
Edited	500	4,430	8.86
Unedited	1,017	8,260	8.13

The descriptors punched on to cards are then sent to the Medical Research Council Computer Services Centre where a computer programme has been written to sort them into an information retrieval language. For the purposes of the experiment we are dividing the lists of descriptors into sets of five hundred. The cards for each set will be processed separately. By comparing the consistency of the outputs from different sets we hope to be able to adjust the processing to give us a suitable output of descriptors to form the information retrieval language. The quality of the language must be tested by, among other things, actually using it in an information retrieval service.

The cards for the first five hundred edited lists have been sent for processing. There are 4,430 cards, which gives an average of 8.86 descriptors per reprint. We have previously submitted the cards for four hundred unedited lists. The average number of descriptors from the unedited lists was 8.3.

The computer has been programmed to select the two hundred, three hundred, four hundred, etc., descriptors which best satisfy certain criteria of selection. For example, the three hundred which it selects from the 4,430 input will be a descriptor output from which the information retrieval language might be compiled. Two criteria of selection have been chosen in the first instance, with provision for a third. They are:

1 Frequency of occurrence of a particular word or phrase.
2 The most important descriptors from each list, say, the first four (see appendix 2).
3 A weighting factor that can be applied to any descriptor if for any special reason its chances of being selected are to be improved or worsened.

For the first computer run an arbitrary proportion of the factors (or criteria) 1 and 2 has been chosen. It helps to think of these factors as ingredients of a recipe whose proportion in the recipe can be varied. By comparing the outputs from different sets of lists it should be possible to find an optimum mixture of the ingredients. As yet no use has been made of facility 3.

The output could, without more ado, be put into service as an information retrieval language. Alternatively, the crude information retrieval language can be structured into a sophisticated thesaurus.

Aim 2: To explore the possibilities of members of a learned society helping in the setting up of an information retrieval system for their use.

We feel that a gain in economy, together with better user awareness of the value and use of information, can be achieved if users do their own indexing. This has been tried before and shown to (*a*) work, and (*b*) not work successfully. We have a useful number of collaborators and are keeping records which will enable us to produce some meaningful statistics as evidence one way or the other.

Method 2

Our collaborators have been asked to do two important things—to help choose the Biomedical Engineering literature sample for the experiment, and to use their own words as descriptors to the circulated reprints, thus dictating the actual words to be used in the language. For example, the preferred word among synonyms like 'pig', 'hog' and 'swine' will become evident.

When the information retrieval language has been compiled the collaborators will be asked to switch from allocating any descriptors they wish to allocating descriptors from some form of thesaurus—thus continuing the job they are doing now, but this time with discipline.

The members of the Biological Engineering Society and the Hospital Physicists Association, who are helping, range from new graduates to distinguished professors and consultants, and are from many branches of medicine and engineering.

Collaboration

It is, of course, very important to keep our collaborators fully informed of the progress of the project, and of their individual performance as indexers. With each new batch to be allocated with descriptors is sent an individual letter giving encouragement. The most common fault is the use of lengthy phrases as descriptors. These, of course, have high specificity, but are unlikely to be used by other people, and so unlikely to satisfy the criteria of frequency of occurrence. An interesting trend is towards the use of fewer descriptors as the indexer becomes familiar with the task. This is probably due to a mixture of laziness and a realization of the unimportant things to be left out of the indexing. This trend is thought to be bad, and collaborators are reminded to read the whole paper, and to index important topics which may not be revealed in the title and abstract.

Another important way of keeping the pot boiling is by sending out to all collaborators and other interested parties the FAIR Newsletter. This is issued about quarterly and contains such items as progress statistics, general comments on descriptor allocation, how to judge the order of importance of the descriptors, progress with microfilming, tendencies in indexing performance, use of trigraphs to cope with very large classes of descriptors, e.g. anatomy, etc.

Some kind of incentive to collaborate is needed, of course, and our collaborators will receive in the first instance a set of feature cards to use as a subject index to their own set of the references to reprints used in the experiment. Later, the collaborators may be invited to become users of the satellite library system at a reduced subscription.

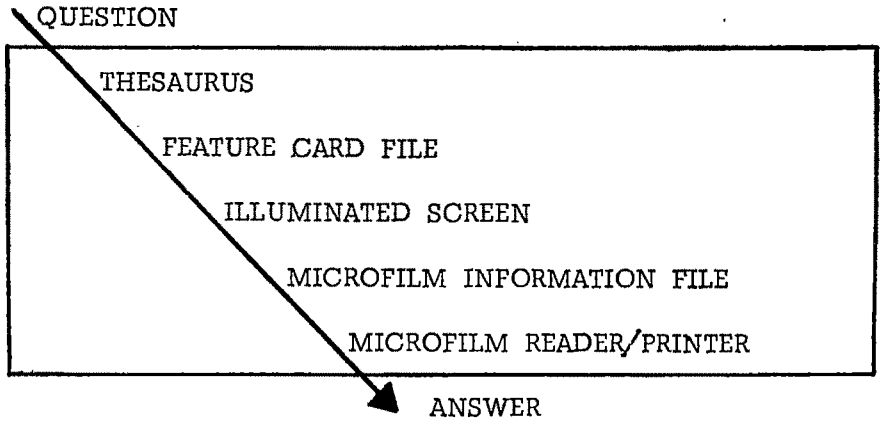
Aim 3: To test the practicability of providing a whole library on the individual's desk

The ideal of a large collection of literature in the individual's own subject field to hand on his desk or in his laboratory has been mentioned already.

The size of the subject field has been discussed, but as to the size of the collection, it is thought that an annual intake of about ten thousand articles should be manageable.

Method 3

One way the satellite library might be achieved is illustrated in the diagram below:



The items boxed would be the actual components of the on-desk library. The thesaurus, the information file, and the feature card index would be regularly updated.

A user would rephrase his query into descriptors from the thesaurus, pull out the feature cards whose titles were the chosen descriptors, superimpose the cards on the illuminated screen, note the identity numbers of locations of optical coincidence, pull out the microfiche whose accession numbers are the same as the location identity numbers and read the microfiche on the reader/printer.

In order to evaluate this concept, and its economics, it is necessary to explore various ways of reducing our entire collection to microfiche. A cheap and easy way of mass-producing microfiche has to be found. A survey of cameras, filming services, readers, reader/printers and copiers has been made and we have purchased several items of equipment. A flow-type 16 mm. camera and a Diazo film copier have been used to reproduce very acceptable microfiche from 5 inch strips of 16 mm. film stuck edge to edge to form a 5 × 3 inch card. The technicalities of this process are not yet finalized but will be reported later.

Copyright is a very important problem. Some publishers have indicated a willingness to allow us to use their copyright material in this way, after a period of time. An approach to publishers will be made in order to thoroughly explore the possibilities of agreements.

I have mentioned the updating of feature cards—there are a number of ways of doing this. An eighty-column card reproducer which is capable of inter-stage round hole punching has been bought. This gives a capacity of 1,920 positions per card. A five-card size would contain 9,600 positions. Of course overprinting of hole locations would be necessary.

Another way of updating a feature card is to start with a pack of large

capacity cards per descriptor, and punch the whole pack each time. A set of top cards is sent after, say, the first one thousand places are used, a set of second cards after, say, the first two thousand have been used, etc., the previous set being thrown away after each new updated one is received. This system is available commercially. A bonus to the use of eighty-column cards as feature cards is that the mechanization of the inversion step and the punching becomes feasible. If an indexer marks locations on an eighty-column card, each mark to represent a particular descriptor he wishes to use, then these indexing work cards can be machine processed to produce punched feature cards. The possibility of this technique is to be tested.

Conclusions

The research project is a test of novel ideas in that it involves the use of known techniques to explore several difficult problems in the field of Information Retrieval. A by-product of the research will be a library and information service in the field of Biomedical Engineering. In about eighteen months it should be possible to report the results of our studies. All that has been done here is to outline the problems and our ideas of how to tackle them.

I extend warm thanks to the members of the Biological Engineering Society, and to the Hospital Physicists Association who are collaborating in this experiment. Without their help we could not explore any of these fascinating problems.

APPENDIX ONE

GUIDE TO THE ALLOCATION OF DESCRIPTORS

1 First and foremost look at the paper from a bioengineering point of view.
2 Allocate as many descriptors as you wish, up to the maximum of fifteen.
3 The descriptors, in combination, should specify the contents of the article.
4 Each descriptor should represent a single concept, or idea, and may be a phrase or single word.
5 Descriptors must be listed in descending order of importance, i.e. the first

is to be the most important. The 'ranking' of your words and phrases is very important, and we suggest you make notes on the space provided, or on the back of the form, before listing them.

6 Do not use abbreviations.

7 Do not use two descriptors to describe the same idea.

8 Use the descriptor 'review' if it is a survey or review paper.

9 If you choose a word or phrase which is a member of a class of descriptors, you should consider the use of the class word as an additional descriptor, e.g. if you use 'polyvinylchloride' consider the use of 'plastics' as well.

10 Transcribe trade names and formulae into proper chemical names.

11 Avoid lone adjectives like 'long' and 'thin'. Only 'high' or 'low' may be used to qualify variables such as 'efficiency', 'power', 'speed', etc. For example, suppose a high temperature device is described—use 'temperature', or if necessary 'high temperature', not 'high' or 'hot' alone.

12 If the location of something inside or outside a body is important, use 'internal' or 'external'.

13 Use the substantive form rather than the adjectival, except where the adjective is an essential part of the descriptor. For example, 'sun' is better than 'solar' unless the 'solar system' is meant.

14 Use the participial form instead of the gerundive, e.g. use 'sintering' not 'sintered'.

15 In the case of alloys the name of the major constituent should be used in addition to the descriptor 'alloys'. Permitted exceptions are commonly used names such as 'brass', 'steels' and 'stainless steels'.

16 The function of electronic circuits, rather than their type, should be used, e.g. if a flip-flop is involved, use 'mono-stable' and 'circuit', or if an Eccles-Jordan circuit is used, the descriptors should be 'circuit' and 'bi-stable'.

17 Try to reveal the interesting detail which may not be indicated by the title or abstract. Please read the whole paper.

18 Whilst you are allocating descriptors please bear in mind that the words and phrases you use should be those in which you would express a request for information on the particular topic.

These instructions are sent to FAIR collaborators. The returned descriptor lists are corrected for mistakes in following the above guide lines, and the rules below for editing are applied.

Additional rules to be used for editing

1 The definite and indefinite article, and prepositions preceding a descriptor, must be removed, except in cases where it has become part of the concept, e.g. 'on-line control'.

2 The plural of descriptors will be used in all cases where a class of objects or materials is meant. The use of the plural or singular form of a word or phrase must be consistent.

3 Descriptor phrases must be kept short. The absolute maximum is sixty characters, including spaces and punctuation.

4 Are any special features required, e.g. 'brief', 'Russian', 'thesis', 'conference paper', etc.?

5 Consistency must be maintained in cases like 'stimuli' and 'stimulations'.

6 *Alloys:*

a If it is pure Al isotope use 'Aluminium 27'.

b If it is pure natural Al with no attempt at isotopic purity, only chemically pure, use 'Aluminium'.

c If it is an alloy, the important thing about it being the fact that it is an Al alloy, use 'Aluminium Alloys'.

d If it is an alloy but its composition does not matter use 'Alloys'.

e If it is a class of alloys use 'Stainless Steels', 'Magnox', etc.

f If it is an alloy of which all constituents are important use 'Aluminium Alloys', 'Magnesium Alloys', etc.

7 *Computers:*

a If it is a digital computer use 'computers' + 'digital systems'.

b If it is an analogue computer use 'computers' + 'analogue systems'.

c If it is qualified in any other way, e.g. logical, use 'computers' + 'logical systems'.

APPENDIX TWO

GUIDE TO PUTTING DESCRIPTORS INTO ORDER OF IMPORTANCE

1 Generally, the first four or five descriptors should describe the overall subject of the article.

2 Biological engineering terms should take precedence over others.

3 The remaining descriptors should describe other interesting features of the article.

4 If the article is a particular kind of paper, e.g. a review, this should be used as a descriptor after describing the general subject of the paper, and before describing interesting features, i.e. around positions 4–7.

APPENDIX THREE

THE INDEXING WORKSHEET USED BY COLLABORATORS

Name:

Date out:

Date in:

Accession no:

You are invited to make notes before putting the descriptors in order of importance. If the 'Notes' space provided below is insufficient, please use the back of this form.

Title:

Author:

Reference:

For Project staff use only

Descriptors in order of importance:

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15

Block letters please

Please return the reprint and completed list of descriptors to:

FAIR
Medical Research Council Laboratories
Holly Hill
London N W 3

Notes:

APPENDIX FOUR

SELECTED REFERENCES TO BACKGROUND MATERIAL

LIPETZ, BEN-AMI, Information storage and retrieval. *Scientific American*, vol. 215, no. 3, p. 224–42, September 1966.

KENT, A., Computers and biomedical information storage and retrieval. *Journal of the American Medical Association*, vol. 196, no. 11, p. 109–14, June 13th 1966.

COBLANS, H., Use of mechanised methods in documentation work. Aslib, 3 Belgrave Square, London, January 1966, 89 p.

BALLOU, H. W., Guide to microreproduction equipment. National Microfilm Association, P.O. Box 386, Annapolis, Maryland, 1965. Third Edition.

VICKERY, B. C., On retrieval system theory. Butterworths, London, 1965, 191 p. 2nd Edition.

BARNES, R. C. M., The present state of information retrieval by computer. Available as AERE—R 4514 from HMSO, 4*s* 6*d*, 28 p., 1964.

BOURNE, C. P., Methods of information handling. John Wiley & Sons, Inc., London, 100*s*, 241 p., 1963.

JASTER J. J., MURRAY, B. R., and TAUBE, M., The state of the art of co-ordinate indexing. Documentation Inc., Washington, November 1962.
Nonconventional technical information systems in current use, No. 3. National Science Foundation, October 1962, 209 p.

KENT, A., Textbook on mechanized information retrieval. J. Wiley & Sons, U.S.A., 1962.

BAGG, T. C., and STEVENS, M. E., Information selection systems retrieving replica copies: a state of the art report. National Bureau of Standards Technical Note 157, December 1961, 172 p. Available from U.S. Government Printing Office, Washington D.C., $1.25.

DAVISON, J. F., Programming for digital computers. Putting computers to profitable use. Business Publications Ltd., London, 35*s*, 1961, 175 p.

APPENDIX FIVE

SELECTED REFERENCES TO FURTHER READING

CALLOW, J. H., and PERRETT, J. R. Peek-a-Boo cards by computer. Presented at the 6th Annual Meeting of ICIREPAT, The Hague, October 1966.

VICKERY, B. C., and SIMPSON, D. J. Future of scientific communication. *Science Journal*, vol. 2, no. 7, p. 80–5, July 1966.

LOUKOPOULOS, LOUKAS, Indexing problems and some of their solutions. *American Documentation*, vol. 17, no. 1, p. 17–25, January 1966.

DREW, D. L., SUMMIT, R. K., TANAKA, R. I., and WHITELEY, R. B., An on-line technical library reference retrieval system. *American Documentation*, vol. 17, no. 1, p. 3–7, January 1966.

FAIRTHORNE, R. A., Some basic comments on retrieval testing. *Journal of Documentation*, vol. 21, no. 4, p. 267–70, December 1965.

WOLFF, H. S., and PICKFORD, A. G. A., FAIR (Fast Access Information Retrieval) system: computer programme. Medical Research Council, Internal Memorandum, October 1965, 7 p. (Available on request from authors only.)

ROLLING, L., The role of graphic display of concept relationships in indexing and retrieval vocabularies, including a thesaurus of documentation terms. Available as EUR 2291e from Presses Académiques Européennes, 98 Chaussée de Charleroi, Brussels 6, Belgian Francs 50, 1965, 29 p.

VASWANI, P. K. T., Mechanized storage and retrieval of information *Revue Internationale de la Documentation*, vol. 32, no. 1, p. 19–22, 1965.

EURATOM-THESAURUS. Keywords used within Euratom's nuclear energy documentation project. Available as EUR 500e from Presses Académiques Européennes, 98 Chaussée de Charleroi, Brussels 6, Belgian Francs 125, 1964, 80 p.

CLEVERDON, C. W., and MILLS, J., The testing of index language devices. *Aslib Proceedings*, vol. 15, no. 4, p. 106–30, April 1963.

MEETHAM, A. R., Preliminary studies for machine generated index vocabularies. *Language and Speech*, vol. 6, part 1, January–March 1963.

DISCUSSION

Dr W. E. Batten (Imperial Chemical Industries Ltd.), from the chair, said that it was typical of this kind of work that one had to deal with this mixture of intractable intellectual work and frustrating toil. He suggested that the discussion dealt firstly with the intellectual aspects of FAIR and then with the mechanical aspects.

Mrs J. Jones (Warren Spring) asked how the problem of collaborators assigning multi-concept descriptors was being tackled, and whether there was any relationship between this and the fact that the number of descriptors per paper increased slightly after they had been edited.

Mr A. G. A. Pickford (National Institute for Medical Research) replied that those collaborators who used multi-concept descriptors were individually asked to split them into single concept descriptors. He thought that journals which encouraged authors to allocate descriptors to their own articles, and who allowed these descriptors to be long phrases and even sentences, were possibly setting a bad example to some of the collaborators. The increase in the average number of descriptors per paper from 8.13 to 8.86 after the descriptors had been edited bore out the need to advise collaborators to use single concept descriptors.

Dr Batten offered to recount his experience of thesaurus construction. When he asked for the indexing terms used by the various divisions of Imperial Chemical Industries, the return was 120,000 very miscellaneous terms. These were reduced to some twenty thousand. When it came to indexing it was necessary to make the highlighting of what was important in the document one job, and rendering it in a disciplined terminology another. The local people say 'These are the highlights' and use any words they like to describe them, and then the indexers translate these words into thesaurus terms.

Mr Pickford followed this up by saying that when sufficient descriptors with which to compile the thesaurus had been allocated by the collaborators, without discipline, they would then be asked to switch from free indexing to disciplined indexing using the thesaurus.

Mr A. D. Gilchrist (Aslib) wondered whether the collaborators were indexing solely for the thesaurus compilation, or were indexing the input of an eventual information service. In the latter instance he thought that the average number of descriptors per paper (about 8.5) was rather low. He wondered if this might be due to the collaborators not having the wider

interests of a professional indexer. He thought also that the number of terms in the thesaurus to date was on the low side and that the lack of depth of indexing by collaborators might be the cause.

Mr G. M. Boyd (Lloyds Technical Register) felt that there was no substitute for the intellectual effort involved in compiling a thesaurus. He thought the success of such operations depended on the approach philosophy and gave as an example the problem of choice of synonymous terms. In his view it did not matter what you called a concept. A feature card could be titled 'pig', 'hog' or 'swine', or all three; all one needed to know was whether to punch it or not.

Mr Pickford pointed out that for retrieval from an alphabetical file of feature cards one had to make up one's mind which synonym was to be the heading on the card.

Mr Boyd then suggested that to consider a list of descriptors as a language was dangerous, and added that he thought the list of 1,582 features was too long.

Mr Pickford reminded his audience that a total of 4,430 descriptors had been reduced to 1,582 by simply removing duplicates, and that by the time synonyms, misspellings, etc., had been removed the list would probably comprise about one thousand terms.

Mr Boyd responded that the fact that research was being done into the problem was to be applauded and supported, and that he hoped that Aslib would be kept fully in the picture so that industry in general could benefit.

Dr Batten thought that a language of concepts—if only there were one—had the same relationship to auditory language used for communication as algebra to arithmetic, and that the notation for a concept was just as real as *a* in an equation, where *a* stands for whatsoever you can work it out to be in a particular situation. He suggested that there was an intellectual parallel here.

Mr Pickford said that he would like to define what he meant by 'information retrieval language'. Since a vocabulary is a list of words in a language with their definitions, and a language is a vocabulary and its usage, and that to retrieve is to recover by investigation, and that information is items of knowledge, he would like to define an information retrieval language as a vocabulary and rules for its use in the recovery of information.

Mr K. P. Jones (Natural Rubber Producers' Research Association) pointed out that, since biological engineering was a very dynamic subject field, he felt that a static or finite thesaurus would be inadequate.

Mr Pickford said that to be flexible and prepared to revise and change to accommodate new ideas and terms was vital, and that, happily, co-ordinate indexes were 'open-ended'. He mentioned that when acronyms like 'LASER' grew into usage they should be welcomed into the list.

Mr Jones asked whether it was intended to include generic terms in the biological engineering thesaurus.

Mr Pickford said that he was sure that some generics would be included and that some form of structuring of the language would be necessary. Just how it would be structured had yet to be decided.

Mr G. W. Hart (Office for Scientific and Technical Information) said that he had heard that multi-concept terms were often helpful if widely used and wondered if Mr Pickford had considered having such features as 'body temperature'.

Mr Pickford agreed that there were cases where the concepts resulting from splitting a multi-concept term were much less used than the original combination.

Mr Hart suggested that false drops were more likely if the splitting of multi-concepts was mandatory.

Mr Pickford said that he understood from experts he had consulted that false drops were a greater problem theoretically than they were in practice. Not only did they not occur as often as feared but they were not as black as they were painted, because they contributed to cross-fertilization of ideas. In fact, one of the beauties of a feature card index was that unlikely combinations of descriptors could be tried. The index could be considered as an ideas generating machine.

Dr Batten shared Mr Hart's fears, but suggested that when one starts getting false drops one should then do something about it. To do anything about it in the abstract would almost certainly be a waste of money.

Mr Boyd thought that false drops were a bogy. People who worried too much about them

usually finished up with an extremely complex system which was difficult to work. In his experience, up to twenty terms might be used in indexing, but all one needed to provide unique retrieval was about three features. He thought that a certain amount of sorting over the output was a good thing anyway. Mr Pickford had said, 'Experience leads to pure descriptors' and Mr Boyd thought that this was true. He had observed how inexperienced indexers started by using up to fifty descriptors and finished using an average of six or seven. Mr Boyd felt that small, narrow concepts were bad and that big concepts which overlapped in meaning in a systematic way were needed.

Miss Spurr (United Steel) asked how consistent the indexing had been.

Mr Pickford said he had not been able to measure this but he had looked at sixty pairs of attempts by different indexers at sixty papers. The average number of coincident terms was 2.83; the average number of coincident concepts was 4.05, and the average difference in the number of terms used was 2.62. The descriptor allocation was not disciplined by a thesaurus.

Dr Batten asked if the collaborators were required to index in depth, looking for the important information not revealed by the title or abstract.

Mr. Pickford replied that they had been asked to do just that, but that they might need reminding again and again.

Dr N. B. Dean (Patent Office) wondered whether the figure of four hundred descriptors given as the computer output was rather low. A language of only four hundred terms for a field as large as biological engineering sounded inadequate.

Mr Pickford said that the output was variable from nought to the total number of input terms, and that four hundred was only an example.

Dr Dean told the meeting of a paper on the production of peek-a-boo cards by computer (see reference in the 'Selected References for Further Reading' section).

Mr H. F. Dammers (Shell Research Ltd) asked for further information on the use of eighty-column cards as feature cards, and on methods of joining them together to give a larger capacity card.

Mr Pickford replied that the dimensional stability of eighty-column cards was good enough for optical coincidence of holes to be preserved, even after as many as eight cards had been joined side-by-side with tape. However, he had a more interesting approach than this. He had bought an I.C.T. Reproducer which was capable of interstage punching an eighty-column card with round holes, giving a capacity of 1,920 locations. It was hoped to modify the Reproducer to produce a feature card which was a multiple of the standard eighty-column card size, say, five times normal. This gave a theoretical capacity of 9,600 locations.

Mr Dammers said that one can buy a card which was effectively three eighty-column cards end-to-end, but this gave a most unusual shape for a feature card.

Mr Pickford replied that the Reproducer was fed with the cards longside on, and that a $\times 5$ multiple would measure $5\frac{1}{2} \times 16$ inches.

Mr Dammers asked in what language the computer programme was written, and for more information about the establishing of a descriptor's 'significance'.

Mr Pickford replied that the Medical Research Councils' Computer Services Centre had been instructed as to the requirements for reducing a large random assortment of descriptors to an information retrieval language, and had written a programme for ATLAS in the ABL language. The facility for giving descriptors a weighting called 'significance' had been included in the instructions, but no use had yet been made of it. The type of circumstance where it might be used was if the descriptors needed additional weighting in order to encourage or discourage their inclusion in the language. One might want to discriminate against adjectives or against very general, or panacea, terms, for instance.

Mr C. Sabel (Central Electricity Generating Board) commented that the thesaurus Mr Pickford was compiling might be inadequate because it had been compiled from descriptors used by the collaborators for biological engineering literature *they* had chosen, whereas the eventual input to the system would be selected by the staff of FAIR. The subject area of the input might therefore evolve somewhat and render the thesaurus out of date.

Mr Pickford replied that the sample of literature being used was partly selected by the collaborators and partly by him. The ratio was roughly fifty-fifty. Even so, the subject field would evolve and this emphasized the need for flexibility in the system. In addition to this, the

collaborators are to be asked to switch from indexing without discipline to indexing with the thesaurus, and this should help to provide continuity in the type of descriptors used.

Another matter was the size of the literature sample. A small sample of five hundred documents had been tried, and a larger sample of two thousand documents would be of interest.

Dr Batten commented that some extremists would argue that what was needed was a sample of questions rather than literature, but this was difficult to obtain.

Mr Sabel thought that the on-desk library would be used more for the 'I have written an article and need some references for it' type of query than as an ideas follow up or ideas generating device. He felt that the need for a large central library to back up a system such as FAIR would remain.

Mr Pickford thought that the very nature of biological engineering was such that a wide range of different subjects would get into the system, and that therefore one could get cross-fertilization of ideas and improbable combinations. He agreed that FAIR, like any other single information retrieval tool, would need to be backed up by a large library.

Mr Gilchrist supported Mr Sabel's fears that the satellite library would not be particularly effective as an ideas follow-up device, adding that the time delay in getting published literature into the system was likely to make it inadequate for the innovator.

Mr Pickford was much more hopeful for the usefulness of the on-desk library as an ideas follow-up device, especially if the hopes for a series of satellite library systems were realized. If a central library was able to administer several systems in different subject areas, and the users made aware of the fact that they could use on-desk libraries not only in their own field but others, then a very sophisticated service could be established.

SELECTIONS FROM THE RECENT LITERATURE

ALL ITEMS listed may be borrowed from the Aslib Library, except those marked *, which may be consulted in the Library.

Books and Pamphlets

ANNUAL review of information science and technology, vol. 1—, 1966—, edited by Carlos A. Cuadra. New York, London, John Wiley, 1966. ix, 389 p.

BIVONA, WILLIAM A., *and* GOLDBLUM, EDWARD J.
Selective dissemination of information: review of selected systems and a design for army technical libraries. Reading, Mass. Information Dynamics Corporation, 1966. [55] p. tables, diagrs. $4.00.

BRANDHORST, W. T., *and* ECKERT, P. F.
Guide to the processing, storage and retrieval of bibliographic information at the NASA scientific and technical information facility. College Park, Md., Documentation Incorporated, 1966. ix, 149 p. tables, diagrs. $3.25.

CLEVERDON, CYRIL, *and* KEEN, MICHAEL
Factors determining the performance of indexing systems. Vol. 2: test results. Cranfield, Aslib Cranfield Research Project, 1966. 299 p.

*COPPER DEVELOPMENT ASSOCIATION
Thesaurus of terms on copper technology. 3rd ed. New York, the Association, 1966. 166, [21] p. tables, diagrs.

CREATIVE RESEARCH SERVICES INC.
The use of data processing equipment by libraries and information centers: a survey prepared for Documentation Division, Special Libraries Association and Library Technology Project, American Library Association; with funds provided by the Library Technology Project, under a grant from Council on Library Resources. New York, C.R.S., 1966. 160 p.

DOCUMENTATION INCORPORATED
Report on the United States Geological Survey literature search system, prepared for the American Geological Institute. Bethesda, Md., Documentation Incorporated, 1966. [30] p. diagrs. $4.00.

DUCAS, M.
The problem of communication between specialized documentation services and users. 10 p. Paper presented at F.I.D., 32nd annual Conference, The Hague, 19–24 September 1966.

EALING ASSOCIATION OF STUDENT LIBRARIANS
German study tour, Easter 1966: a brief outline of librarianship in the German Federal Republic and a description of those libraries visited. Ealing, the Association, 1966. 8 p.

*EURATOM. Center for Information and Documentation
Euratom-thesaurus: indexing terms used within Euratom's nuclear documentation system. Part 1. 2nd ed. Brussels, Euratom, 1966. x, 91 p. diagr.

*FEDERATION INTERNATIONALE DE DOCUMENTATION
List of periodical publications received in the Library of the F.I.D. General Secretariat. The Hague, F.I.D., 1966. 20 p.

FISHER, EVA LOU
A checklist for the organization, operation and evaluation of a company library. 2nd rev. ed. New York, Special Libraries Association, 1966. iv, 61 p.

FLEMING, THOMAS P., *and* KILGOUR, FREDERICK C.
Moderately and heavily used bio-medical journals. New Haven, Conn., Yale University, Medical Library, 1966. [8] p. $1.60.

GENERAL DYNAMICS. Convair Division
Kardiak/Mediterm bibliography. San Diego, Calif., General Dynamics, 1965. var. paging. $3.00.

GOFFMAN, WILLIAM
Probabilistic models in information retrieval. Cleveland, Western Reserve University, 1966. [3] p. $1.50.

GRAHAM, J. T.
Computer typesetting: a select bibliography. Hatfield, Hatfield College of Technology, 1966. 39, iv p.

*HANDBUCH der bayerischen Bibliotheken, herausgegeben von Klaus Dahme. Wiesbaden, Otto Harrassowitz, 1966. xx, 191 p. Divided into learned and public libraries, arranged by place with description of scope and facilities of each; particularly full for learned libraries. Includes index of librarians and subjects covered.

HAWKEN, WILLIAM R.
Copying methods manual. Chicago, American Library Association, 1966. xv, 375 p. illus., tables, diagrs. $15.00.

HENDRICKS, DONALD D.
Comparative costs of book processing in a processing center and in five individual libraries. Springfield, Ill., Illinois State Library, 1966. vi, 89 p. tables.

HOUGHTON, BERNARD
Technical information sources: a guide to patents, standards and report literature. London, Clive Bingley, 1967. 101 p. 20*s*.

IBERALL, A. S.
Information science: outline, assessment, interdisciplinary discussion. Yeadon, Pa., General Technical Services, Inc., 1966. [44] p. $3.00.

INDIA. National Scientific Documentation Centre
A brief note on Insdoc and its activities. New Delhi, Insdoc, [1966]. 11 p.

*INSTITUT FRANÇAIS DE RECHERCHES FRUITIERES OUTRE-MER (I.F.A.C.)
Thesaurus documentaire de l'Institut. . . . Ensemble structure des concepts et notions utilisés dans le index de la Revue FRUITS (Fruits d'outre-mer); preface de Ph. Ariès. [Comprehensive structure of the concepts and ideas used in the indexes of the Review FRUITS]. Paris, the Institute, 1966. 215 p.

*INSTITUTE OF TEXTILE TECHNOLOGY. Textile Information Center
Textile technology terms: an information retrieval thesaurus. Charlottesville, Va., the Institute, 1966. ix, 329 p.

JONES, K. SPARCK, *and* JACKSON, D. M.
The use of the theory of clumps for information retrieval: report on the O.S.T.I.-supported project at the Cambridge Language Research Unit, 1966. Cambridge, C.L.R.U., 1965. var. paging.

*LIVERPOOL UNIVERSITY. Library
Finding list of scientific, medical and technical periodicals, 1966 edition. Liverpool, the University, 1966. 169 p. 5*s*. Computer-produced list for users of 28 libraries in or near the University, arranged according to World List of Scientific Periodicals. Future editions to include other Liverpool libraries.

MANCHESTER PUBLIC LIBRARIES
Patents: a brief guide to the patents collection in the Technical Library, [by] J. E. Wild. Manchester, Manchester Libraries Committee, 1966. 27 p.

PHILLER, THERESA AMMANITO, *and others*, *eds*.
An annotated bibliography on technical writing, editing, graphics and publishing. 1950–65. Washington, Society of Technical Writers and Publishers Inc., and Pittsburgh, Pa., Carnegie Library, 1966. no paging. $8.00. Computer produced, with KWIC index.

POMPYANSKII, A. L.
Posobie po perevoda nauchnoi i technicheskoi literatury na Angliiskii yeyk [Customs of translating scientific and technical literature to the English tongue.] Moskva, Izdatelstvo Nauka, 1965.

*PRETORIA. State Library
Current South African periodicals: a classified list, July 1965. Pretoria, the Library, 1966. 167 p. Classified list (16th Dewey). All titles held by State Library. Bi-lingual titles entered under English and Afrikaans. All periodicals in languages other than these, classed together by language, regardless of subject.

ROSENBLOOM, RICHARD S., *and* WOLEK, FRANCIS W.
Studies of the flow of technical information: an interim report. Cambridge, Mass., Harvard University, 1966. [12] p. $2.60.

SAUNDERS, W. L., *ed*.
The provision and use of library and documentation services: some contributions from the University of Sheffield Postgraduate School of Librarianship. Oxford, Pergamon Press, 1966. x, 198 p. tables. 50*s*.

SEMINAR on automation in the library, Rosary College, River Forest, Ill., March 18–19, 1966. Papers presented . . . edited by Sister Mary Girolama McCusker. River Forest, Ill., Rosary College, 1966. iv, 77 p. tables. diagrs.

*STANDING CONFERENCE ON LIBRARY MATERIALS ON AFRICA
The SCOLMA directory of libraries and special collections on Africa. 2nd ed., compiled by Robert Collison. London, Crosby Lockwood, 1967. [vii], 92 p. 35*s*. Libraries are arranged alphabetically by place. Fifteen libraries have been added, and much of the information extended, in this edition. Contains details of SCOLMA publications.

STUDY CONFERENCE ON LIBRARY APPLICATIONS OF COMPUTERS AND DATA PROCESSING EQUIPMENT, Nottingham, April 19–22, 1966
The library and the machine: selected papers and discussions. Ed. by C. D. Batty. Scunthorpe, Library Association. North Midland Branch, 1966. 56 p.

SWANSON, DON
Education for library planning. Ottawa, Canadian Library Association, 1965. 19 p. (Canadian Library Association, Occasional Paper no. 62.) 85 *c*.

SWANSON, ROWENA M.
Information system networks . . . let's profit from what we know. Arlington, Va., U.S. Air Force. Office of Scientific Research. Office of Aerospace Research, 1966. [26] p. diagrs. $3.00.

UHLEIN, ERHARD
Terminologie der Dokumentation. . . . Frankfurt am Main, Deutsche Gesellschaft für Dokumentation, 1966. 64 p.

UNITED STATES. Clearing House for Federal Scientific and Technical Information
Classification—Indexing: a report bibliography. Springfield, Va., CFSTI, 1965. 34 p.

*UNITED STATES. Department of Commerce. *Office of Technical Services*
Compendium of technical information services. Washington, the Department, 1966. [31] p. $3.00.

WAYNE STATE UNIVERSITY. School of Medicine. *Library and Biomedical Information Service Center*
Study of the use of Wayne State University Medical Library. Detroit, Michigan, the University, 1965. 2 vols.

*WHO's who in library service: a biographical directory of professional librarians in the United States and Canada. 4th ed. Hamden, Conn., Shoestring Press, 1966. [8], 776 p.

WILSON, ROBERT A.
Optical page reading devices. New York, Reinhold, 1966. ix, 197 p. illus., diagrs. $10.00.

WORKSHOP ON WORKING WITH SEMI-AUTOMATIC DOCUMENTATION SYSTEMS. Warrenton, Va., 2–5 May, 1965.
Proceedings. Warrenton, Va., Airlie Foundation, 1965. iii, 106 p. tables, diagrs. Sponsored by U.S. Air Force Office of Scientific Research and System Development Corporation.

Articles and Papers

ARIES, PHILIPPE
Fabrication automatisée d'index par phrase-clé. [Automatic construction of indexes by key word.] Reprint from *Documentaliste*, numero special, 1966, p. 89–93.

BARTFAI, I.
A Magyarorszagi muszaki konyvtaroskepzes kialakulasa es fejlodese napjainkig. [Origins and recent developments in the training of technical librarians in Hungary.] *Tudomanyos es Muszaki Tajekoztatas*, no.13, December 1966, p.880–96.

BERNHARD, F., *and others*
Erstellung von Konkordanzen zu Sanskrittexten durch elektronische Rechenlagen. [Electronic data processing in the production of concordances for Sanskrit texts.] Reprinted from *Linguistics*, vol.22, June 1966, p.5–21.

BOND, SELAH
Proofs in the lithographic process. *Graphic Arts Progress*, vol.13, no.4, July–August 1966, p.1–6. Discussion of reproduction (repro) proof and 'the pre-press' colour proof, which are unique to lithography and may be generated from a common source.

BOYD, A. H.
Computer processing of Library of Congress book numbers. *Program*, no.4, January 1967, p.1–7.

CARNOVSKY, LEON
Changing patterns in librarianship: implications for library education. *Wilson Library Bulletin*, vol.41, no.5, January 1967, p.484–91. Origins and progress in education in the United States.

CROSS, L. C.
Promoting order out of growing chaos. (Computer-based information services). Reprinted from *Chemistry in Britain*, October 1966, p.441–5.

DICKERSON, F. REED
A legal document retrieval system for the Federal Aviation Agency. Copied from *M.U.L.L.*, December 1965, p.191–216.

DIRECTORIES: a preliminary checklist. *Manchester Review*, vol.11, Autumn 1966, p.42–58. Holdings of Manchester Public Library.

EATON, WILLIAM W.
Costs of IR. *Information Retrieval Letter*, vol.1, no.10, February 1966, p.1–2.

FAIRTHORNE, ROBERT A.
Similarity and stability of textual interests. Extracted from Conference on Information Retrieval. Proceedings, 1963, p.183–97.

FOSKETT, D. J.
The library in the age of leisure. *Library Association Record*, vol.69, no.1, January 1967, p.7–10.

FOX, E. S.
Academic libraries in the U.S.A. *Library World*, vol.68, no.799, January 1967, p.183–7. Tour by University and Research Section of the Library Association of Washington, Boston and New York libraries.

GAWNE-CAIN, H.
The potential use of computers in the newspaper and printing industry. *Computer Bulletin*, vol.10, no.3, December 1966, p.58–60.

GENZEL, PETER
Der internationale Schriftentausch der wissenschaftlichen Bibliotheken der DDR. [The international exchange of publications of the scientific libraries of the GDR.] *Zentralblatt für Bibliothekswesen*, vol.80, no.12, December 1966, p.707–26.

HOLLEY, EDWARD G.
Resources for research in urban areas. *Wilson Library Bulletin*, vol.41, no.5, January 1967, p.502–9. Reference and inter-library loans facilities available.

KANBUR, M. M.
Research in library science. *Iaslic Bulletin*, vol.11, no.3, September 1966, p.183–95.

LIPETZ, BEN-AMI
The evaluation of communication systems: some thoughts on effectiveness. *Sci-Tech News*, vol.20, no.4, Winter 1966, p.110–13.

MCCLELLAN, A. W.
Library developments affecting the book trade. *Library Association Record*, vol.69, no.1, January 1967, p.2–6.

MORE FROM MEDLARS
Nature, vol.213, January 21, 1967, p.223. Summary of service available to scientists through National Lending Library.

MUMFORD, L. QUINCY
International breakthrough: an account of the operational beginnings of the Shared Cataloging Program. *Library Journal*, vol.92, no.1, January 1, 1967, p.79–82.

ORNE, JERROLD, *ed.*
Current trends in collection development in university libraries [special issue]. *Library Trends*, vol.15, no.2, October 1966. Articles on libraries of Yale, Cornell, Illinois, University of California among others.

PHOTO-LISTING for the world's largest publication: the British Museum's General Catalogue of Printed Books. *Reproduction*, vol.4, no.2, February 1967, p.18–21.

POMASSL, GERHARD
Der Wert der Bibliothekskataloge fur die information. [The value of library catalogues for information.] *Zentralblatt für Bibliothekswesen*, vol.80, no.12, December 1966, p.726–9.

PRINTING for easy and efficient reading [review of TINKER, MILES A. Bases for effective reading]. Copied from *British Printer*, vol.79, no.4, April 1966, p.114, 116, 118.

SRIVASTAVA, ANAND P.
Recommendations of the U.G.C. review committee's report on library science in Indian universities: a critical evaluation. *Islic Bulletin*, vol.11, no.3, September 1966, p.170–82.

STRAIN, PAULA M.
Indexing a periodical run. *Sci-Tech News*, vol.20, no.4, Winter 1966, p.114–6.

The TALKING machine: the development of audio response units and future applications of such equipment. *Computer Weekly*, January 12, 1967, p.8.

TIBOR, TOMBOR
Vallalati es kutatointezeti muszaki könyvtarak tervezese. [Planning of technical libraries in industry and research institutes]: special issue. *Orszagos Muszaki Konyvtar es Dokumentacios Központ*, no.25, 1966. Outlines tasks and functions of technical libraries; main part is on planning and equipment, accompanied by very clear and useful drawings of all types of library furniture and equipment.

TOM, SEWERYN
Badanie potrzeb uzytkownikow informacji. [Evaluating the needs of the users of information.] *Aktualne Problemy Informacji i Dokumentacji*, vol.11, no.5, 1966, p.9–14.

TUTHILL, OLIVER W.
The thrust of information technology on management. Copied from *Financial Executive*, vol.34, no.1, January 1966, p.18–29.

UNGURIAN, O.
Systemy wyszukiwania informacji. [Systems of retrieval of information.] *Aktualne Problemy Informacji i Dokumentacji*, vol.11, no.5, 1966, p.1–5.

VINCE, V.
Az Aslib 1966: evi 40 konferenciaja Scheveningenben. [The 40th Conference of Aslib, held in Scheveningen, 1966.] *Tudomanyos es Muszaki Tajekoztatas*, no.13, 1966, p.846–54.

WIEDLING, STEN
Erfarenheter av nya dokumentationssystem. [Experiences with a new documentation system (MEDLARS).] Reprinted from *Farmacevtisk Rev.*, vol.65, 1966, p.593–.

ZARUBA, MILOSLAV
Prehled o literature zpracované vrocníku 1966 casopisu 'Referativnyj zurnal 59–naucnaja i techniceskaja informacija. [Analysis of coverage of Referativnyj Zhurnal . . .] Copied from *Technicka Knihovna*, October 1966, p.303–8.

New Periodicals

ISLIC BULLETIN: bulletin of the Israel Society of Special Libraries and Information Centres, Tel Aviv. Vol.1, no.1, 1967–.

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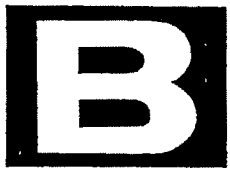

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Volume 19 **April 1967** **Number 4**

ASLIB CALENDAR 1967

April

WED.26.	Textile Group Annual General Meeting.

May

THU.4 – SAT.6.	Midlands and Northern Branches joint conference, Buxton Spa. See paragraph below.
MON.15 – WED.17.	Chemical Group conference at Attingham, near Shrewsbury.
WED.17.	Evening meeting.
THU.18.	Technical Translation Group. 'International Advertising', by P. A. Clifton.

June

FRI.16 – SUN.18.	Electronics Group annual conference, Ashridge House, Berkhamsted.
FRI.23.	Engineering Group visit to National Engineering Laboratory.

October

MON.9 – THU.12.	41st Annual Conference at Harrogate.

Computers in libraries

A joint Conference of the Midlands and Northern Branches will be held at the Palace Hotel, Buxton Spa, Derbyshire, from Thursday 4th May to Saturday 6th May 1967.

In preparing the papers for the Conference, it was decided to assume that those attending would have no knowledge of computers. The papers, therefore, will explain what a computer is, and what it can do; the problems and areas in libraries and librarianship where a computer may profitably be used will then be analysed, and possible shortcomings in the use of computers in libraries will be discussed. The educational requirements, in computer techniques, of library staff will be considered. These general papers will be followed by contributions on 'The public library attitude to computers', 'Computers for special services', and 'Computers and the functions of a national library'.

The Conference fee is £10 10*s*. Further information may be obtained from the Midlands Branch Secretary, Mr D. F. Reardon, City of Birmingham College of Commerce, Aston Street, Gosta Green, Birmingham 4. Late bookings will be accepted.

FID/IFIP Conference 1967

The preliminary programme of the joint conference of the International Federation for Documentation and the International Federation for Information Processing (*see Aslib Proceedings* vol. 18, no. 10, October 1966, p. 286) lists seven sessions. In the first, three papers are presented describing the present state of the art, and covering methods and principles, computer languages, and hardware. Two sessions are devoted to 'File organization and search strategy, automatic indexing, classification and retrieval', covering theoretical as well as practical aspects. Further sessions deal with 'Economics and comparison of documentation systems', 'Computer-aided production of publications and indexes', and 'Information networks and on-line systems'. Altogether about fifty papers will be given. A summary and conclusions will occupy the final session. The Chairman will be Dr S. D. Duyverman.

The FID/IFIP Conference 1967 will be held in the Palazzo dei Congressi in Rome, from Wednesday 14th to Saturday 17th June. All papers will be given in English.

The *Proceedings of the FID/IFIP Conference 1967* will be published in early 1968 by the North Holland Publishing Company.

The preliminary programme, registration forms and detailed information are available from the General Secretariat of the FID, 7 Hofweg, The Hague, Netherlands, or from the Secretary General of IFIP, Mr Mackarness, c/o British Computer Society, 23 Dorset Square, London NW1.

Training Course in Indexing

More aspects of indexing will be included in the Sixth Training Course in Indexing arranged by the Society of Indexers and the North-Western Polytechnic, and more opportunities for practical work will be provided. These changes are in response to replies to questionnaires completed by students who

attended last year's course. This too has prompted an extension of the course to five days, instead of four.

New subjects in this year's course are medical, legal, automatic, and post-co-ordinate indexing.

Other subjects are: scientific and technical indexing, the indexing of archives and current business records; indexing periodicals; subject headings; alphabetical arrangement; the Long Index (Humanities); and the editing, preparation for the press and the proof reading of indexes.

The course is being held at the North-Western Polytechnic, from Monday 5th to Friday 9th June 1967 inclusive, and the fee for the whole course will be £4.

Full particulars and a form of application will be sent on receipt of a SAE to the Organizer, Indexing Course, North-Western Polytechnic, Prince of Wales Road, London NW5.

Libraries and the Book Trade

There will be a three-day conference on 'Libraries and the Book Trade' at the School of Librarianship, Liverpool, from Monday 1st to Wednesday 3rd May. The topics for the three days are, successively, Publishing, Censorship and Bookselling.

The conference fee is £2 (10*s* for those attending single days or sessions only).

Inquiries should be addressed to Raymond Astbury, Conference Organizer, School of Librarianship, College of Commerce, Liverpool 2.

Scottish Summer School

The Scottish Library Association's Summer School this year will be held at Newbattle Abbey College, from Saturday 1st to Friday 7th July. Topics will include document copying; the Indian library scene; education in leisure; projecting our image; libraries in Finland; introducing computers; libraries, users and computers; libraries in hospitals; planning university libraries; the future of Scottish public libraries; and public libraries and the future of the book trade.

Further information may be obtained from Mr A. G. D. White, A.L.A., Hon. Sec., SLA Summer School, Blackhall Library, Hillhouse Road, Edinburgh 4.

DRTC Seminar

Documentalists are invited to contribute papers and to participate in the Documentation Research and Training Centre's Seminar at Bangalore from 15th to 20th December 1967. The seminar will be under the direction of Dr S. R. Ranganathan and will cover developments in classification, subject headings and feature headings, and the management of reprography service.

All enquiries should be addressed to the Convener, DRTC Seminar, 112 Cross Road 11, Malleswaram, Bangalore 3, India.

Plasma physics SDI

The United Kingdom Atomic Energy Authority's Culham Laboratory is to extend, on an experimental basis, its current awareness information service in plasma physics.

The Office of Scientific and Technical Information has awarded the Laboratory a grant for the work, which will consist of two experiments running concurrently from 1st March 1967.

Since April 1966 the Culham Laboratory has been using a KDF 9 computer to match the current input of information, in the form of journal articles, reports, etc., to the subject interests of individual scientists in the Laboratory, the fields covered being plasma physics, controlled nuclear fusion and certain peripheral subjects such as astrophysics, vacuum technology and superconductors.

The first experiment is to extend the selective dissemination of information (SDI) system to plasma physicists in other laboratories in the UK and overseas.

The second experiment is to design and evaluate a retrospective retrieval system. This is distinct from SDI and is based on the information already stored in the computer, which is operated on-line through remote consoles.

Clearinghouse for bibliographic systems

The Bibliographic Systems Center (School of Library Science, Western Reserve University) has announced that with the aid of a Unesco grant it will establish a Clearinghouse for Scientific and Technical Classification Schedules, Key-word and Descriptor lists, and Thesauri in the English language. Upon inquiry, the Center will inform individuals and organizations of items relevant to their areas of interest; they may then borrow any of the material for four weeks.

As a consequence of the grant, the Center will be able to enlarge substantially its basic collection (at present approximately 900 titles in the scientific and technical fields) and will be able to continue free service to users.

Inquiries should be addressed to the Bibliographic Systems Center, School of Library Science, Western Reserve University, 11161 East Boulevard, Cleveland, Ohio 44106, USA.

Criminology

The Studiecentrum voor Kriminologie en Gerechtelijke Geneeskunde has announced that its research during the next five years will include the following projects:

Librarianship and criminology (1967)
Organization and criminology (1967–72)
Periodicals in criminology and their history (1968–9)
International repertory of criminological research centres (1968–70)
International and national associations of criminology (1968–71)
Documentation and information on criminology (periodic).

The address of the Studiecentrum is: Parklaan 2, Sint Niklaas Waas, Belgium.

National Reference Library *Aids*

Three more publications in their series *Aids to readers* have recently been produced by the Holborn Division of the National Reference Library of Science and Invention. The series aims to enable all users to take full advantage of the Library's stock.

The new *Aids* are:

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Reserve holdings of Russian literature. How to trace items in the rapidly growing stocks of Russian scientific and technical books. (All currently published titles announced in *Novye Knigi SSSR* are now received.)

Copies are available free on application to the Keeper, National Reference Library of Science and Invention (Holborn Division), 25 Southampton Buildings, London WC2.

Library and Information Bulletin

This new quarterly is published by the Library Association in order to alert members to the services provided by their Association's library and information bureau, and to record monograph additions to the library.

The first number contains a review article on library statistics, an account of replies to a questionnaire survey of gramophone record collections in public libraries made in 1965, research notes, a bibliography of reading surveys, and a list of monograph additions to the library. This last consists of modified BNB entries arranged according to the Classification Research Group's draft scheme for Library Science published in 1965.

The *Bulletin* is to be published four times a year by the Library Association, 7 Ridgmount Street, Store Street, London WC1. The annual subscription is £3.

Geographical names

LANA, G., *and others.* Glossary of geographical names. Elsevier, 1967. 55*s.*

This is the latest addition to Elsevier's *Glossaria Interpretum* series, and covers English, French, Spanish, Italian, German and Dutch.

Most of the entries are for the names of towns, but some countries, counties, regions, waterways and rivers are also included. The main entry is under the English name and the alternative names used in the other languages are also given under this entry and marked by the initial letter of the language: these names are cross referenced by one long alphabetical index at the back. If a name used in a foreign country is the same as the English one no entry is made, but if the compilers have been unable to trace the particular name used in a country the fact is indicated.

There are over 4,300 entries in this dictionary and it should prove extremely useful.

Subject Guide to Forthcoming Books

This year the R. R. Bowker Co. has started publishing the *Subject Guide to Forthcoming Books*. It is to appear bi-monthly and each issue covers books to be published in the USA during the following five months.

Designed to bring up to date the annual *Subject Guide to Books in Print*, this new periodical lists by subject those books which appear in *Forthcoming Books* under author and title. The subjects are arranged alphabetically and the books in each category are listed alphabetically by title. The expected month of publication and price are given for most entries.

It is doubtful if there will be much demand for this periodical in Britain, but where such a list is required, this should be satisfactory.

The annual subscription outside the USA is $8.50. For those who already take *Forthcoming Books* the subscription is $7.0.

TRAINING IN THE USE OF BIOLOGICAL LITERATURE

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Paper presented at the Aslib Biological Group meeting, Friday 25th March 1966

THE literature of biology is an expensive tool kept in a library, usually remote from the laboratory. Compared with modern apparatus, it appears absurdly simple. Anyone with three A-levels can use it. Besides, the funds are separate; even if one saves money on books, one cannot buy another spectrophotometer. It is always someone else who buys books. So the literature has a high cost-to-use ratio.

Librarians, all too often, understand neither science nor how scientists work, for very few have been scientists. There are therefore two problems—to educate the biologist and to enlighten the librarian. For the former we must ask three questions: when should we introduce the biologist to the whole literature? Should we do so in stages? How long should we spend on it? In the first year there should be a talk about the library, classification and reference books. At some time between the second year and the first postgraduate year we should introduce students to the literature proper. During the second year the student should be encouraged to look at reviews, etc., as well as books. He should regularly read a few selected journals in subjects in which he is interested as well as general scientific journals such as *Nature*. On the whole, we believe he has little time for anything deeper at this stage, although he should develop the habit of reading. The final year is different: then he should attend a course of lectures, tutorials and practical instruction on the use of the literature. This is the time for him to learn about

a The use of abstracts and reviews;
b The use of non-journal literature, e.g. government publications, patents, etc.;
c The main literature sources in his major field;
d The use of computer-produced indexes such as BASIC, CBAC, *Biological Abstracts* Systematic Index, and the products of the MEDLARS programme;
e The importance of 'quickies', of symposia, meetings, newsletters, etc.

Some if not most of these topics are common to biology as a whole. Our experience suggests that instruction in these should be given as an interdisciplinary course for all biologists. As far as possible suitable information

should be distributed in the form of notes, and the lectures should be used to raise problems of special interest.

Who should conduct such a course? Not, on the whole, librarians, for, just as we have had descriptive and experimental scientists, so we now have custodial and experimental librarians. Some of the latter group can perhaps be described as information scientists. These can make a useful contribution to such a course, but it should be conducted mainly by working scientists, far more of whom can be induced to take an interest in this field than is at first apparent.

We are, in the main, concerned with training future working scientists, not information workers, and so must adopt a practical view of the biologist's needs. He is not interested in the finer points of library classification; he is interested in getting books so arranged that he can find and use them. If he wants to do a literature search he will *not* start at 1870 and work up to the present day; he will not go to BNB or the *Encyclopaedia Britannica*. Nor is it likely that he will go to *Biological Abstracts*. He will probably start from a reprint, something in *Nature*, a review, or a colleague's advice. This may not be the best start, but the methods recommended by too many librarians would put him off a search altogether. He is probably not interested in *all* the papers on a subject. Life is too short. He *is* interested, however, in the most important. This means knowing where to look at the particular time. Who publishes the *Biochem. J.* and when it first started is of no interest to him. Who publishes *in* the *Biochem. J.* is much more to the point.

We have said elsewhere that just as there has been exponential growth of science as a whole, so each subject shows a logistic growth curve.[1] At each stage of this growth cycle the literature needs of the scientist are different. At first the problem is to find the right journal and to recognize the paper that is important. Probably personal contact is most valuable at this stage. Later in the subject's development attending symposia, reading *the* journal or journals, reprints or preprints from friends and personal contacts provide the vital information. (Published papers may be two years late.) At the period of exponential growth, current awareness services spring up, and reviews that are not two years out of date start to appear. Here and later the conventional literature search through abstracts, reviews, etc., will be helpful. As scientific interest shifts to other fields the encyclopaedic works begin to appear.

The biologist requires some operations-research-type guidance through the mass of literature potentially available to him, and here the experimental information scientist can help greatly. Martyn and Slater have analysed the recovery of items from compact bibliographies by the use of abstracting journals.[2] They found some surprisingly low recovery rates in biology. They also showed that *if* you go to the *right* (i.e. best) abstracting journal first, you gain very little more by going to all the others as well. If this is so, it would be most useful to know *which* are the best abstracting journals for, say, each five-year period for each kind of subject.

Courses should help the biologist to solve material problems. For example, during its career there have been many changes in the indexes of *Biological Abstracts*. For any particular year, which index should one use, or should

one use *Zoological Record* or *Chemical Abstracts*? The biologist should also be shown how to evaluate the worth of a paper once he has found it.

One of us has recently analysed the bibliographies in a number of newsletters. This analysis showed that for the limited field covered, the bibliography in the newsletter is a quicker and much more comprehensive source of information than the abstracts journals.[3]

There are, in fact, three distinct problems of communication for the scientist.

1 Keeping up with a particular line of research or interest (including both the peripheral and the pertinent);
2 A new line of research—often a method or technique;
3 Odd information.

Keeping up is the main difficulty, and here there seems to be a cleavage between those who use and those who tell us how to use. A significant number of bench scientists use the current awareness services as an early warning retrieval system, possibly their only retrieval system—if they miss an item, it is too late anyhow.

Tests on current awareness journals can indicate their relative efficiencies when used as early warning retrieval systems,[4] and information of this type can be of more use to the working scientist that a long list of literature sources.

The search for a specific item from the literature or for odd information (what is the toxicity of XYZ for the wallaby?) is usually very well dealt with in most courses and by libraries. But until we can tackle the everyday problem of the bench scientist we are failing him.

How does this affect postgraduate students? The NLL have pioneered a fortnight's course for them in which there are about twelve hours of lectures and the rest of the fortnight is spent in the library doing a literature search on their proposed research. Is this the right balance? We would suggest a three-day course at this stage or in the final undergraduate year. A one- or two-week literature search should be left until the end of the second year of research, prior to writing the introduction to the thesis. The NLL rightly point out that the students on their course are amazed at the immense quantity of pertinent references they discover. But at this stage students cannot judge what is junk and what is valuable. There is nothing so pathetic as a postgraduate student with two thousand references on his topic; it seems to him that there is absolutely *nothing* left to do. When he comes to do the first piece of actual work he may find that the simplest starting point is still not settled.

What of the student who finds his problem has already been solved? This shows that his supervisor should himself have attended a literature course. There is, however, an important difference here between the physical and the biological sciences. No two living things are the same. It is mainly because they are different that we can discover how they work. There is no final answer in biology—only a greater awareness of the complexity of living things. Duplication of work in the biological sciences is therefore necessary and can lead to new ideas.

Our course at Bradford derives from the annual courses on the use of chemical literature at Liverpool which started in 1959. Both are a blend of lectures by information specialists and practising scientists and both involve directed

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library work. Apart from subject, the major difference is in the clientele. About 70 per cent of those attending the first chemical literature course were practising chemists, as distinct from information workers. Although this dropped to about 45 per cent in 1966, it was still far higher than the percentage of practising biologists who have enrolled for the Bradford courses. More than 80 per cent of the students on our biological literature courses were either librarians or information workers and there were as many organic chemists as biologists. Most chemists are aware that a problem exists, even if at university they receive very little instruction on how to use the literature. We have little evidence that biology graduates are instructed in how to use the literature, apart from floras and faunas. It may be then that they are not really aware either that a problem exists or that it is possible to learn how to tackle it.

Apart from helping our students to cope with the increasing flood of biomedical literature, courses in the use of biological literature could point the way to a new type of career for the biology student. The University Grants Committee's yearly survey of the employment of graduates shows that a small number of new graduates in biology have difficulty in finding jobs. It is therefore not surprising that a survey of recent appointments in information work shows that of the regrettably small number of science graduates appointed nearly 40 per cent were biologists (a higher percentage than for chemists).

There seems no doubt that the graduate who has studied the biological sciences, with a strong emphasis on their interdisciplinary aspects, has an excellent background for a career in information work. There are opportunities in information work for the biology graduate, but we must first interest him in its problems as an undergraduate and train him after graduation.

REFERENCES

1 WYATT, H. V. (1966). In *The Use of Biological Literature*, ed. by R. T. Bottle and H. V. Wyatt. Butterworths.

2 MARTYN, J., and SLATER, M. (1964). *Journal of Documentation*, 20, 212–35.

3 WYATT, H. V. (1967). *Institute of Biology Journal*, 14, 19–21.

4 BOTTLE, R. T. (1965). *Journal of Documentation*, 21, 177–89.

Letter to the Editor

LIBRARY MANAGEMENT STUDIES

Dear Sir,

We are trying to develop Library Management Studies at this School, at all postgraduate levels from diploma to research degree. in ways that are agreeable to academic management studies and to modern requirements in library and information work.

We can only hope to succeed in this if we can draw on the experience of librarians and information officers whose services have undergone management investigations. It would be extremely valuable to us to have copies of any records of such case studies, or permission to borrow and study them, with all proper safeguarding of confidentiality. We would also be most grateful for any informal or personal comments or suggestions from such librarians, or others interested in the practice or teaching of management in these fields. We feel that there is an uncommonly good opportunity at present for this new professional subject to be developed, for practice and study, in a mutually helpful way.

Yours faithfully,

RONALD STAVELEY
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London WC1.
17th March 1967.

SELECTIONS FROM THE RECENT LITERATURE

ALL ITEMS listed may be borrowed from the Aslib Library, except those marked *, which may be consulted in the Library.

Books and Pamphlets

*AMERICAN SOCIETY FOR TESTING AND MATERIALS
Five-year index to ASTM technical papers and reports, 1961–1965. Philadelphia, Pa., the Society, 1966. vi, 145 p. $6.50. ($4.50 members.)

BARKER, R. E., *and* DAVIES, G. R., *eds.*
Books are different: an account of the defence of the net book agreement before the Restrictive Practices Court in 1962. London, Macmillan, 1966. xx, 938 p. £6 6*s*.

BRASENOSE CONFERENCE ON AUTOMATION IN LIBRARIES, Oxford, Brasenose College, 30th June–3rd July 1966
Proceedings of the Anglo-American Conference on the mechanization of library services held at Oxford under the chairmanship of Sir Frank Francis and sponsored by the Old Dominion Foundation of New York, edited by John Harrison and Peter Laslett. London, Mansell, 1967. xv, 173 p. tables.

*CANADA. National Research Council. *Technical Information Service*
National technical information services: worldwide directory. 2nd ed. Prague, Ustav pro Technické a Ekonomické Informace, 1966. 73 p. (F.I.D. no. 399.)

CHAMBERS, ERIC
Photolitho-offset. London, Ernest Benn, 1967. xvii, 282 p. diagrs. 25*s*.

CHEMICAL ABSTRACTS SERVICE
Guide for abbreviating periodical titles. Columbus, Ohio, the Service, 1966. xiv, 29 p. $1.

CONGRÈS DE CALCUL ET DE TRAITEMENT DE L'INFORMATION, 3e. Toulouse, 14–17 May 1963
[Actes du 3e Congrès de l'AFCALTI . . .] Paris, Dunod, 1965. ix, 406 p. tables, diagrs. 95*s*.

CONGRÈS DE CALCUL ET DE TRAITEMENT DE L'INFORMATION, 4e. Versailles, 21–24 April 1964
[Actes du 4e Congrès de l'AFIRO . . .] Paris, Dunod, 1965. vii, 413 p. tables, diagrs. 95*s*.
AFCALTI joined the Société Française de Recherche Operationelle in March 1964, to become Association Française d'Informatique et de Recherche Opérationnelle (AFIRO).

CONVEGNO INTERNAZIONALE T. D. 65. Torino, 30 September–2 October 1965
Formazione e aggiornamento alle tecniche documentarie. Torino, CSAO, 1966. 212 p.

DAY, KENNETH, *ed.*
Book typography, 1815–1965, in Europe and the United States of America. London, Ernest Benn, 1966. xxiii, 401 p. plates. 105*s*.

DIBELLO, FRANK A., *and* VIIL, HEINO
The definition of requirements for a sea-launched missile information analysis center. Silver Spring, Md., Vitro Laboratories, 1965. vii, 49 p. tables, diagrs. $3.

GOLD'GAMER, G. I.
Organizatsiya i planirovka rabot sluzhb informatsii [The organization and planning of operations of the information services.] Washington, Joint Publications Research Service, 1965. a-b, 184 p. tables. (JPRS 28,310). $5.
Translation of original book, published by 'Ekonomika' Publishing House, Moscow, 1964, p. 1–195.

INFORMATION
San Francisco, London, W. H. Freeman, 1966. vii [3], 218 p. tables, diagrs. (A Scientific American Book.) $2.50.
Originally published as 12 articles in *Scientific American*, September 1966.

IRONMAN, RALPH
Writing the executive report. London, Heinemann, 1967. 145 p. 25*s*.

MARTINSON, JOHN
Vocational training for library technicians: a survey of experience to date. Washington, Communication Service Corporation, 1965. viii, 116 p. illus., tables. $3.

MITTAL, R. L., *and* GUPTA, SHAMSHER
Dictionary catalogue: a practical manual. Delhi, Metropolitan Book Co., 1966. xi, 509 p. diagrs. Rs. 25.

NEWMAN, SIMON M., *ed.*
Information systems compatibility. New York, Spartan; London, Macmillan, 1965. vi, 150 p. tables, diagrs. (The American University Technology of Management Series, vol. 1. *Gen. ed.*, Paul W. Howerton.) 60*s*.

*OXFORD. University. *Commonwealth Forestry Institute. Library*
Basic library list for forestry. 4th ed., edited by E. F. Hemmings. Oxford, the Institute, 1967. 59 p. 7*s* 6*d*.

PERKINS, RALPH
The prospective teacher's knowledge of library fundamentals; a study of the responses made by 4,170 college seniors to tests designed to measure familiarity with libraries. New York, Scarecrow Press, 1965. 202 p.

*SCOTTISH HOSPITAL CENTRE
Enquiry into library services in Scottish hospitals. Edinburgh, the Centre, 1967. var. paging.

SELYE, HANS
Symbolic shorthand system. New Brunswick, N.J., Rutgers State University, Graduate School of Library Service, 1966. viii, 9–89 p. diagrs. (Rutgers series on systems for the intellectual organization of information, edited by Susan Artandi.)

SPECIAL LIBRARIES ASSOCIATION. Washington Chapter. *Documentation Group*
Initiating a library automation program: papers presented at the 1965–1966 meetings. Washington, the Chapter, 1966. iv, 35 p. $1.

SYMPOSIUM ON COMMUNICATING THE RESULTS OF RESEARCH AND DEVELOPMENT, London, Imperial College, September 29, 1966
[Proceedings], edited by L. R. Parkes. London, The Research and Development Society, [1966]. 50 p.

UNITED NATIONS
The libraries of the United Nations: a descriptive guide. New York, United Nations, 1966. vii, 126 p. illus. 11*s* 6*d*.

*UNITED STATES ATOMIC ENERGY COMMISSION. *Division of Technical Information Extension*
Directory of USAEC specialized information and data centers. Oak Ridge, Tenn., the Division, 1966. no paging.

*UNITED STATES LIBRARY OF CONGRESS. *Subject Cataloguing Division*
Subject headings used in the dictionary catalogues of the Library of Congress. 7th ed., edited by Marguerite V. Quattlebaum. Washington, Library of Congress, 1965. viii, 1432 p. $15.

*UNITED STATES NATIONAL LIBRARY OF MEDICINE
Current holdings of mainland Chinese journals. Washington, the Library, 1966. 26 p.

*UNITED STATES NATIONAL LIBRARY OF MEDICINE
Directory of biomedical institutions in the Union of Soviet Socialist Republics, by Mordecai Hoseh. Washington, U.S. Department of Health Education, 1965. v, 343 p. $2.

*UNITED STATES NAVAL POSTGRADUATE SCHOOL
Library periodicals: current subscriptions and earlier holdings. [Monterey, Calif.], the School, 1966. [114] p. $11.60.

WELLISCH, H.
A generally applicable material facet for the UDC. Tel Aviv, Israel Society of Special Libraries and Information Centers (ISLIC), 1966. 16 p. (Contributions to information science, no. 1.)

*WHO OWNS whom, 1966–67 (Continental ed.) volume I—France, volume II—Western Germany, Austria, Denmark, Norway and Sweden, volume III—Belgium and Luxembourg, Holland, Italy and Switzerland . . . 6th ed. London, O. W. Roskill, 1966. var. paging.

Articles and Papers

ASSOCIATION OF COLLEGE AND RESEARCH LIBRARIES. *Committee of Standards*
Guidelines for library services to extension students. *ALA Bulletin,* vol.61, no.1, January 1967, p.50–53.

BARNES, CHRISTOPHER
Classification and cataloging of spoken records in academic libraries. *College and Research Libraries,* vol.28, no.1, January 1967, p.49–52.

BEHRSTOCK, JULIAN
Unesco's book development programme. *Unesco Chronicle,* vol.12, no.10, October 1966, p.383–7.

BEN-MENAHEM, N.
The Institute for Hebrew Bibliography. *Libri,* vol.16, no.3, 1966, p.170–4.

BEYDON, C.
Coopération documentaire dans le domaine de l'automation et du traitement de l'information. [Sphere of action of the research centre for the automatic processing of information.] *Bulletin de l'A.I.D.,* vol.5, no.4, 1966, p.3–5.

BLANKENSHIP, W. C.
Head librarians: how many men? How many women? *College and Research Libraries,* vol.28, no.1, January 1967, p.41–48.

BOGDAN, LIANA, *and* LAZARESCU, GEORGETA
O experienta de aplicare a indexarii coordonate in domeniul informarii. [An experiment related to the application of co-ordinate indexing in the field of information.] *Studii si Cercetari de Documentare si Bibliologie,* vol.8, no.3, September 1966, p.343–9.

COLLABORATION on abstracts. *Nature,* vol. 213, no.5075, February 4, 1967, p.433. Co-operation between UKAEA and Nuclear Science Abstracts on British literature.

DOCUMENTATION methods in the field of ekistics. [Meeting of research group in Athens during Athens Ekistics Month, papers by Vivian S. Sessions, Jaqueline Tyrwhitt and C. W. Hanson.] Copied from *Ekistics,* vol.22, no.133, December 1966, p.418–31.

GAWNE-CAIN, H.
Systems for typesetting. *Computer Weekly,* February 16, 1967, p.6.

GENUNG, HARRIETT
Can machines teach the use of the library? *College and Research Libraries,* vol.28, no.1, January 1967, p.25–30.

GOPINATH, M. A., *and* NEELAMEGHAN, A.
Colloquium in teaching library science. *Library Science,* vol.3, no.4, December 1966, p.338–43.

GOSLING, M. P.
Printing by 'fotolist'. *O. & M. Bulletin,* vol.22, no.1, February 1967, p.22–27.

GROVE, LEE E.
John Murray and paper deterioration. *Libri,* vol.16, no.3, 1966, p.194–204.

HARROD, L. M.
What I want from a professional journal. *Library World,* vol.68, no.800, February 1967, p.219–20.

HEAPS, DOREEN
Experiments in information retrieval and documentation training. *Canadian Library,* vol.23, no.4, January 1967, p.272–6.

HOLST, W.
Problemer ved strukturing og bruk av den polytekniske tesaurus. [Problems of construction and use of the polytechnical thesaurus.] *Tidskrift for Dokumentation,* vol.22, no.5, 1966, p.69–74.

JONES, K. P.
Information retrieval at NRPRA [Natural Rubber Producers' Association]. Reprint from *Rubber Journal,* January 1967, 3 p.

KOLDER, HANSJOERG, *and* SIMPKINS, IRWIN, F.
Selective dissemination of information and the academic science library. *College and Research Libraries,* vol.28, no.1, January 1967, p.53–57.

KUMAR, SUSEELA
Education of the librarian. *Library Science,* vol.3, no.4, December 1966, p.315–21.

The LAW library and legal research. *Research News,* vol.17, no.3–4, September–October 1966, p.1–12.

MCDANIEL, J.
Machine translation of natural languages. *Bulletin of the Institute of Information Scientists,* vol.5, no.3, 1967, p.5–8, 21.

MOHRHARDT, FOSTER E.
IFLA: International Federation of Library Associations. *ALA Bulletin,* vol.61, no.2, February 1967, p.187–90.

MOHRHARDT, FOSTER E., *and* OLIVERI, BLANCHE L.
A national network of biological-agricultural libraries. *College and Research Libraries,* vol.28, no.1, January 1967, p.9–16.

NEAMTU, OCTAVIAN
Rolul unitatilor de cercetare in informarea curenta a cercetatorilor. [The role of research units in the current information of research workers.] *Studii si Cercetari de Documentare si Bibliologie,* vol.8, no.3, September 1966, p.321–31.

NEELAMEGHAN, A., *and* BHATTACHARYYA, G.
Pre-course apprenticeship for B.Lib.Sc. *Library Science,* vol.3, no.4, December 1966, p.321–8.

NEELAMEGHAN, A., *and* BHATTACHARYYA, G.
Teaching of cataloguing. *Library Science,* vol.3, no.4, December 1966, p.362–70.

NEELAMEGHAN, A., *and* BHATTACHARYYA, G.
Teaching of classification. *Library Science,* vol.3, no.4, December 1966, p.371–85.

OVCHINNIKOV, V. G.
Tezaurus i nekotorye metody elo nostroeniya. Ch. II. Metody nostroeniya tezaurusa. [The thesaurus and its method of construction. Part 2. Methods for construction.] *Nauchno-Tekhnicheskaya Informatsiya,* no.9, 1966, p.20–26.

PARKHI, R. S.
Education for teachers of library science. *Library Science,* vol.3, no.4, December 1966, p.385–8.

PEAKE, DOROTHY G.
Punched cards in Department of Main Roads Library. *Australian Library Journal* vol.15, no.6, December 1966, p.246–52.

PELTZ, MARGARETA, *and* STEFANESCU, MARINA
Aplicarea metodei de indexare coordonata in cadrul Institutului Geologic. [Application of the coordinate indexing method at the Geological Institute.] *Studii si Cercetari de Documentare si Bibliologie,* vol.8, no.3, September 1966, p.333–42.

RADFORD, NEIL A., *and* BARRY, JOAN E.
I.B.M. punched card circulation at Sydney University Library. *Australian Library Journal,* vol.15, no.6, December 1966, p.228–34.

RAHMAN, ABDUL
Teaching of reference service. *Library Science,* vol.3, no.4, December 1966, p.343–61.

RANGANATHAN, S. R.
Vitalising the university education of librarians. *Library Science,* vol.3, no.4, December 1966, p.293–315.

RAPID information retrieval [Selexfilm Eccetron]. *Measurement and Control,* August 1963, p.312–14.

RAY, G. F.
Standardization of paper sizes. *BSI News,* February 1967, p.8–11, 15.

REES, ALAN M.
What we should teach special librarians. *Special Libraries,* vol.58, no.1, January 1967, p.33–36.

REPORTS on the 32nd Annual Meeting of IFLA, held in Scheveningen, the Hague, September 12–17, 1966. *Library of Congress Bulletin*, vol.25, no.44, 3rd November 1966. Appendix 2. [12]p.

SHANK, RUSSELL
Administration training in graduate library schools. *Special Libraries*, vol.58, no.1, January 1967, p.30–32.

SHAW, RALPH R.
Automation: trieval, retrieval and detrieval. *Australian Library Journal*, vol.15, no.6, December 1966, p.217–19.

SMITH, HANNIS S.
A seamless web: the systems approach to library service. *ALA Bulletin*, vol.61, no.2, February 1967, p.180–5.

SMITH, IRVING H.
Research papers and the small college library. *Library Journal*, vol.92, no.3, February 1, 1967, p.544–5.

STOCKTON, PATRICIA ANN
An IBM 357 circulation procedure. *College and Research Libraries*, vol.28, no.1, January 1967, p.35–40.

SWANK, RAYNARD C.
Documentation and information science in the core library school curriculum. *Special Libraries*, vol.58, no.1, January 1967, p.40–44.

SWANSON, DON R.
On improving communication. Copied from *Bulletin of the Atomic Scientists*, vol.22, no.2, February 1966, p.8–22.

TAYLOR, ROBERT S.
The interfaces between librarianship and information science and engineering. *Special Libraries*, vol.58, no.1, January 1967, p.45–8.

TEAGUE, S. J.
Catalogue card production using a tape-typewriter. *Library World*, vol.68, no.800, February 1967, p.228, 234.

YOUNG, HELEN
Performance and program budgeting: an annotated bibliography. *ALA Bulletin*, vol.61, no.1, January 1967, p.63–67.

ZACHERT, MARTHA JANE K.
Special libraries instruction: the separate course. *Special Libraries*, vol.58, no.1, January 1967, p.37–40.

New Periodicals

HARVARD LIBRARY BULLETIN. vol.15, no.1, January 1967
Bulletin has resumed after gap of six years. Plans to publish articles about Harvard collections and research based on Harvard Library material. Will also publish general articles on books and scholars.

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TECHNICAL SWEDISH, DANISH, NORWEGIAN translated by J. T. Craddock, B COM, FIL, Ekard, Ray Park Avenue, Maidenhead, Berks. Maidenhead 24931.

WILFRED E. GOODAY, ARSM, DIC, MIMM, FIL. Member of Translators' Guild. Romanian and French. 161 Rivermead Court, London SW6. Renown 1912.

TECHNICAL TRANSLATIONS from Russian, German and Polish into English. B. Klipstein, B SC(HONS), 1 Glenview Grove, Shipley, Yorkshire. Tel. Shipley 58215.

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TRANSLATIONS: TECHNICAL, SCIENTIFIC, all west-European languages. J. Smuts, B SC (ENGINEERING), FIL, 12 Thorndene Avenue, London N11. LABurnum 7723.

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Appointments vacant

ASSISTANT LIBRARIAN — RESEARCH DEPARTMENT—required by the Calico Printers' Association Limited at their Head Office in Manchester. Applicants should have at least four GCE 'O' levels including English Language, and preferably either ALA or previous experience in a technical library. The Assistant Librarian will be responsible for the daily routine of the Library and will also be required to assist with devising and operating new information retrieval systems. We offer good conditions of employment including five-day week. Applications in writing stating age, qualifications and experience should be made to: The Employment Manager, The Calico Printers' Association Limited, Oxford Street, Manchester 1.

LIBRARIANS (GRADE IV) in GOVERNMENT DEPARTMENTS — Applications are invited from men and women for posts in: (*a*) Military Engineering Experimental Establishment, Christchurch, Hants. (one post); (*b*) Royal Military College of Science, Shrivenham, Swindon, Wilts. (one post); (*c*) Ministry of Power, London SW1 (one post); (*d*) Safety in Mines Research Establishment, Sheffield (one post); (*e*) Royal Botanic Garden, Edinburgh (one post). Candidates must have had some practical experience of librarianship and must (*a*) have passed one of the following professional examinations of the Library Association, viz. the Registration Examination (1963 or earlier), the Part II (Final) examination (1964 or subsequently), or the postgraduate professional examination; or (*b*) have otherwise attained Associateship of the Library Association; or (*c*) hold an approved university degree, or diploma, in librarianship. A scientific background or training would be an advantage. STARTING SALARY: £685 (at 20) – £970 (at 25 or over), possibly higher at 26 or over. Salary increased for Librarians serving in London. Scale maximum £1,457. Non-contributory pension. Promotion prospects are good. WRITE to Civil Service Commission, Savile Row, London W1, for application form, quoting 6650/67. Closing date 1st May 1967.

ASSISTANT LIBRARIAN required for small but active library and information service. Applicants should have experience of indexing and retrieving technical information. Duties will include handling readers' inquiries, literature searches and general loans service. Professional qualifications and/or experience in a special library an advantage. Five-day week; superannuation scheme. Salary according to age, qualifications and experience. Applications to: The Director, Machine Tool Industry Research Association, Hulley Road, Macclesfield, Cheshire.

MINISTRY OF AGRICULTURE, FISHERIES AND FOOD. FOOD STANDARD, SCIENCE AND SAFETY DIVISION, London. SCIENTIFIC OFFICER/SENIOR SCIENTIFIC OFFICER to take charge of section dealing with information and liaison in Food Science and Technology. Experience in food industry information problems an advantage. QUALIFICATIONS: 1st or 2nd class honours degree in science, preferably chemistry, microbiology or food science or a similar qualification. SALARY (Inner London): S.O. £996 – £1,659; S.S.O. £1,829 – £2,240. Promotion prospects; non-contributory pension. APPLICATION FORMS from Civil Service Commission, Savile Row, London W1, quoting S/52-53/MAFF.3. Early application advised.

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in

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A vacancy has arisen in the Data Processing Service of the Research Department at Alderley Park, Macclesfield, Cheshire, for a man or woman to join a team engaged on the indexing, storage and retrieval of chemical and biological test data.

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The minimum qualification required is organic chemistry to degree or Higher National Certificate level. Some experience in nomenclature and molecular formula indexing would be an advantage.

The Company offers excellent conditions of work which include a contributory Pension Fund.

Please apply to
The Personnel Manager (J.M.)
Imperial Chemical Industries Ltd.,
Pharmaceuticals Division,
P.O. Box 25,
Alderley Park, Macclesfield, Ches.

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Application forms may be obtained from:

Mr. W. C. A. Knights,
Government of Saskatchewan,
28 Chester Street,
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Please apply to Ref.: CA.31, Research and Development Department, The Metal Box Company Limited, Kendal Avenue, Westfields Road, Acton W.3.

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To assist the Information Officer in the operation and development of the Service and to have particular responsibility for the day-to-day operation of the lending and reference services and for the accessioning, cataloguing, classification and listing of materials added to the library.

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Please send a postcard for an application form and further details to the Senior Personnel Officer, (Ref: A/266205), The Culham Laboratory, Abingdon, Berks.

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Applications, stating full relevant details and present Salary, should be forwarded as follows:

For the post at Leatherhead to N. Berryman, Personnel Officer (Headquarters), 15 Newgate Street, London, E.C.1. *Quote Ref. AP*/109.

For the post at Berkeley to the Personnel Officer, Berkeley Nuclear Laboratories. *Quote Ref. AP/BNL*/17.

INFORMATION SCIENTIST

In support of the research programme at the newly established Research Centre, the Electricity Council wish to appoint an assistant to the Information Scientist in covering the full range of information services.

The post is particularly suited to a young graduate interested in furthering a career as an information scientist and seeking an opportunity to extend his/her knowledge of information services.

Candidates should possess a degree in electrical engineering or physical sciences.

● **The salary for this appointment will be within the range £980-£2,045 per annum, plus £60 per annum supplementary payment, according to qualifications and experience.**

Applications, or requests for further information to Mr. D. C. Page, Head of Personnel Services, Electricity Council Research Centre, Capenhurst, nr. Chester. Quoting Ref.: AP/61.

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at
West Gloucestershire College of Further Education, Cinderford

Applications are invited for the post of Tutor Librarian, commencing 1st May, 1967, to take charge of the developing College Library. Applicants should be chartered librarians. **Salary Grade 'B' Burnham Scale, £955-£1,625.**

Further particulars and form of application from the Principal, to whom completed forms should be returned immediately.

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EXPERIENCED UDC CLASSIFIER

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The South African Science Office,
Chichester House,
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D. H. Smith, *Librarian, Oxford College of Technology*

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Standards and Specifications Information Sources

Edited by Erasmus J. Struglia, Consumers Union of the United States.
A guide through the confusion of technical standards for manufactured and processed materials of all kinds. The book covers general and government sources of standards information; directories of organizations, agencies, and individuals interested in standardization; bibliographies; guides to periodical indexes which include material on standards; and international aspects of standardization, including organizations, publications, etc. Author-title index. 187 pages. $8.75.

Public Utilities Information Sources

Edited by Florine E. Hunt, librarian, Public Service Electric and Gas Company, Newark, New Jersey.
A bibliography that provides for quick and easy access to information about all major aspects of the electric, gas, telephone and water industries. Its nine sections cover general works; public utility economics; public utility accounting; rates and rate making; regulation of public utilities; electric industry; public ownership and electric power; gas industry; and telephone and water industries. Author, title, and subject indexes. 200 pages. $8.75.

Transportation Information Sources

Edited by the late Kenneth N. Metcalf, librarian and archivist, Henry Ford Museum and Greenfield Village, Dearborn, Michigan.
An annotated bibliography covering the literature of air, pipeline, rail, water, and road transport. In addition to conventional automobiles, trains, ships, and airplanes, it covers such other things as taxicabs, helicopters, yachts, monorail systems, motorcycles, and automotive safety. Library, government, and statistical information sources are cited, as are periodicals, indexes, abstracts, and services; private and university research programs; literature and bibliography; professional and trade associations; transportation industry literature; organization source books; and university transportation activities. Author-title-source index. 307 pages. $8.75.

Business Trends and Forecasting Information Sources

Edited by James B. Woy, head of the Mercantile Library, The Free Library of Philadelphia.
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Aslib Proc. vol.19 no.5 pp.119-156 London, May 1967

ASLIB PROCEEDINGS

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Volume 19 **May 1967** **Number 5**

ASLIB CALENDAR 1967

June

WED.7.	Aslib Annual General Meeting. Birmingham.
TUE.13.	Co-ordinate Indexing Group at Aslib, 5.30 p.m. 'The logic of co-ordinate indexing.'
FRI.16 – SUN.18.	Electronics Group annual conference, Ashridge House, Berkhamsted.
THU.22.	Aslib meeting. Patent information services. (See paragraph below.)
FRI.23.	Engineering Group visit to National Engineering Laboratory.
MON.26 – THU.6.	Senior Introductory Course to Special Library and Information Work. (See paragraph below.)

July

THU.27.	Aslib visit. Port of London Authority.

October

MON.9 – THU.12.	41st Annual Conference at Harrogate.

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International Conference on Education for Scientific Information Work

The first International Conference on Education for Scientific Information work was held at Queen Elizabeth College, London, from 3rd to 7th April 1967. It was organized by Aslib, the Institute of Information Scientists and OSTI, on behalf of the FID. Fifty-six delegates from sixteen countries, most of them representing organizations actually engaged in training scientific information workers, attended the conference. Thirty-three papers had been prepared and preprinted, and formed the basis of the discussions at the sessions. The discussions, which were at a high level, showed that there were many problems common to all countries. A number of subjects for action and discussion were passed on to the Training Committee of the FID, which met on the day after the conference. Interest was shown in developing a basic core curriculum, which could be adapted to local circumstances in each country. Several delegates expressed an opinion that not enough attention had been paid in the past to the needs of the small organization and the small country. There was some discussion of the need for clearing-houses for audio-visual materials and other teaching aids, both on the national and international levels. There was great interest in the idea of a high-level international seminar for people from the smaller and less-developed countries, who would go back to their own countries and train teachers of information work. A seminar on these lines may be organized in Western Germany late in 1967. The proceedings of the conference will be published by the FID, probably in September 1967.

In addition to the working sessions, there was a varied social programme. Receptions were held by Aslib, and by the Government, and there was a Conference dinner. A visit was made to Oxford, during which delegates visited the Bodleian Library and the library of the Culham Laboratory of the UKAEA. Delegates also attended the first Aslib Annual Lecture.

Senior Introductory Course to Special Library and Information Work

Following the introduction of the new and enlarged Senior Course in February 1966, demand for this training has increased. The longer ten-day version of the Senior Introductory Course will again be presented at Aslib Headquarters from 26th June to 6th July 1967. It is intended for graduates, or students with comparable qualifications or experience in other fields, who have recently entered special library or information work. Its aim is to give students a broader view of their work than can be obtained by working in a single information department or library, and to suggest ways in which they can increase their knowledge and understanding of information and library work. Lecturers will cover sources of information, and the techniques of organizing and disseminating it. A number of visits to libraries and information departments are included in the programme, and time is also set aside for discussion. The fee for the course will be 21 *gns*.

A programme and application form are enclosed in this issue, and students are advised to apply early. Provisional bookings will be accepted by telephone or telex. In general only students possessing a degree or comparable qualification will be accepted. Other students who wish to attend the course should consult the Education Officer, Mr Bird, before sending in the application form.

Aeronautical Group

Fifty-one delegates attended the sixteenth annual conference of the group at the College of Aeronautics, Cranfield, from Friday 31st March to Sunday 2nd April.

Speakers at the conference dinner included Dr A. J. Barrett and Mr F. H. Smith.

During the weekend the Conference heard papers by Mr C. W. Cleverdon (Achievements of the Cranfield Project), Dr A. J. Barrett (The professional institutions and evaluated information), M. A. Mauperon of Euratom (Adaptation to users' needs), Mr M. Y. Pottage (Monthly periodicals in a large research and development establishment), Mr B. J. S. Williams (Microfilm for retrieval systems), and a technical paper on all-weather operation of aircraft by a representative of the Blind Landing Experimental Unit.

Biological Group

The Annual General Meeting of the Biological Group will be held at the Anti-Locust Research Centre, College House, Wright's Lane, London W8, at 3.30 p.m. on Friday 2nd June 1967.

Following the meeting there will be a discussion of the recommendations put forward as a result of the December Conference on Communication in the Biological Sciences, and a report of the first meeting of the Committee set up as a result of that conference.

SEAC Inventory

As readers will gather from Miss Daphne Grose's article in this issue, the Social and Economic Archive Centre has been collecting details of surveys which may be available for secondary analysis, and has now published a complete inventory.

Brief details for each survey include: research worker or agency, sponsor, title, unit and size, date, and type of material (e.g. punched cards). Surveys are listed under the following headings:

Agriculture
Child Care and Child Development
Consumer Attitude and Habit Studies
Crime and Delinquency
Education
Employment and Occupation
Family and Community
Finance
Geography
Health
Housing and Urban Studies
Immigrants
Industry
Market Studies
Media and Communications
Old People
Overseas Studies
Planning and Land Use
Politics and Political Opinion
Recreation and Leisure
Regional Studies
Religion
Rural Sociology
Social Class
Social Services
Travel and Transport
Youth

No survey material will be available until the Centre moves to the University

of Essex at the end of 1967, but fuller details can be obtained, at a charge of 5*s* a survey.

The *Inventory of Surveys* is published by the SEAC, 12 Upper Belgrave Street, London SW1, price £1. Individual sections are sold at 2*s* each.

Specialized Information Centre

In the belief that the user requires information as well as documentation, a considerable number of specialized information centres have been established throughout the world. The functions of these centres are to acquire all material likely to contain information of interest to users, arrange for expert evaluation, classify and store material for retrieval, and disseminate information according to need through current awareness publications, specialized bibliographies, answers to enquiries and 'state of the art' reports.

OSTI is supporting a small number of new centres as an experiment in which user needs will be studied, services evaluated, working scientists directly involved, and merchanized systems used as sources of input. Useful knowledge will be gained both on the operation of such centres and on their place in the national communication network alongside libraries, documentation centres and large mechanized services.

OSTI hopes that, as the potential role of SICs becomes clear, existing organizations will set up new centres in appropriate subject fields, using their own resources.

Specialized information centres at present supported by OSTI are:

Biodeterioration (University of Aston-in-Birmingham, Department of Biological Sciences).

Intestinal absorption (University of Sheffield, Department of Physiology and Postgraduate Library School).

High-temperature processes (University of Leeds, Houldsworth School of Applied Sciences).

Mass spectrometry (part of critical data centre) (UK Atomic Energy Authority, Atomic Weapons Research Establishment, Aldermaston).

Part-time course in Information Science

The first part-time course outside London leading to the Diploma examinations of the Institute of Information Scientists will begin this September at the Department of Librarianship at the Leeds College of Commerce. It will extend over three academic years with one day a week attendance at the college.

Although based on the syllabus of the Institute, the course will also include intensive instruction in technical German and Russian. The part one examination will be taken in December 1968 and part two in June 1970.

Further information can be obtained from Mr N. E. Dain, FLA, Head of the Department of Librarianship, 28 Park Place, Leeds 1.

Computer Project at Washington

Washington State University Library has received a grant of $69,500 from the National Science Foundation for the analysis and design of an on-line, computer-based, technical services system, and a book catalogue cost study, and

for the development of specifications for an on-line library terminal. For this the library will use the University's IBM 360/67 computer.

The technical services design will include all the library functions of ordering, receiving, searching, cataloguing, catalogue book and/or card production, and book marking.

The book catalogue production cost study will cover all methods of reproducing computer-produced catalogue copy, and will also include a study of computer printer output rates as determined by the printer's character set.

The library terminal design study will develop specifications for on-line library terminals, particular emphasis being placed on circulation and technical services process control.

The project started last year and is expected to be completed in three to four years. Its director is Dr G. Donald Smith, Director of Libraries at Washington State University.

Science of Science

The Library Committee of the Science of Science Foundation is organizing a one-day meeting (attendance by invitation) at the University of Sussex on 24th October 1967.

A discussion is planned on working papers dealing with existing collections and the bibliographical control of the literature of the Science of Science, the development of exchange of documents and indexes between institutions, and technical questions concerning the cataloguing and classification of this material.

Any libraries or institutions active in this field who wish to take part in the meeting should get in touch with The Director, Science of Science Foundation, c/o The Ciba Foundation, 41 Portland Place, London W1.

NLL Translations Survey

In 1966 the National Lending Library for Science and Technology carried out a survey to assess the foreign language problem facing scientists and technologists in this country.

Two types of questionnaire were distributed, one to scientists and technologists and the other to librarians and information officers in organizations on the NLL list of approved borrowers. Completed questionnaires were received from 2,355 scientists and 1,045 librarians—a response rate in each case of just under 50 per cent.

Some of the main results were:

1 Over 90 per cent of the scientists were capable of handling French, 66 per cent German and 10 per cent Russian. Less than 0.1 per cent were able to understand oriental languages.
2 About 80 per cent of the sample had encountered a language problem in the last year. In 30 per cent of the cases the problem involved Russian literature, in 30 per cent German and in 17 per cent Japanese.
3 Only a small proportion knew or made use of existing translation indexes and services.

A full report of the results of the survey will appear in the June issue of the *Journal of Documentation.*

AIDS

The Automation Instrument Data Service (AIDS) is a computer-based industrial information system that has been developed by Indata Limited with the active co-operation of the Scientific Instrument Research Association. Concentrating initially on the automation, electronics and scientific instrument industries, the service offers a 'current awareness' of new products introduced in subject categories specified by subscribers, who choose the categories of products in which they are interested from a list of 309 engineering subjects. These categories are used to match the subscriber's needs against incoming new products during each weekly computer run, and thus determine the product cards he will receive.

Each subscriber receives loose-leaf folders in which standard sized eighty-column computer cards are housed. These cards, one for each new product, are sent each week to the subscriber whenever products are received within the range of subjects he has specified. They contain a full engineering specification with an illustration and a free-text description of up to eight hundred words.

The subscriber also receives master lists of the cards he is to receive each week, and profile lists for up to five other individuals within his organization who wish to be kept informed of products falling into sub-sets of the range he has specified. Indata maintains a servicing department to ensure that all recently received cards are filed.

Feedback to manufacturers of interest in products is facilitated by a tear-off stub that forms part of each product card. When received at Indata the marks on the stubs are read by the computer, which prints out manufacturer advice lists.

The folders, which are matched to the subscriber's needs, also contain cards that enable him to notify Indata of any change of profile.

Comprehensiveness of the range of product data is maintained by obtaining the co-operation of the manufacturers. Accuracy is maintained by a team of graduate engineers who edit the incoming data. The cost varies from £30 to £375 depending on the number of categories selected by the subscriber.

Further information may be obtained from Indata Limited, Boundary House, 18/22 Furnival Street, London EC4.

Reviews

The following note has been received from Dr J. Horne, Department of German, Birmingham University.

Das grosse deutsche Vörterbuch, Gutersloh, C. Bertelsmann Verlag, 1967. £6 6*s* (approx.).

The German publishing house of Bertelmann, often compared to the most modern factory, with computer and other up-to-date data processing machinery, has just published what seems to me the most modern and comprehensive German dictionary. This is an equivalent to the Shorter Oxford and like this—it may have been a pattern of perfection—it provides much more than a collec-

tion of today's usage of German. It contains also an introduction to the language, grammar, phonetics, word division, etymology, some 250 short treatises on the language itself, style, regional uses, and a canon of the current best writings.

In scope this book, with over 4,200 columns (three per page of this half-leather bound, yet light tome), is all-embracing, it seems. Wherever I touched it and tested its scope, the yield was positive, of commercial or technical entries, more so than the specialist glossaries with which I compared the entries. The work will easily hold its own in comparison with veterans like the large Langenscheidt—it is in fact a cyclopaedia of German usage. The book can safely be recommended to all advanced users of German, in business, factory management, chambers of commerce, reference libraries of special or general agencies, and anyone connected with exports and imports, as regards German-speaking countries. At six guineas the book is a bargain.

Advances in Colloid and Interface Science

Elsevier Publishing Company has published the first issue of a new quarterly journal, *Advances in Colloid and Interface Science* (March 1967). It is described as an international journal devoted to experimental and theoretical developments in interfacial and colloidal phenomena and their implications in chemistry, technology and biology.

The journal is to contain long review articles, aiming to bring together the results of research carried out in many different fields. Previous attempts at setting up a continuing series on advances in the field of colloids and interface science were unsuccessful.

The present series is issued as a journal in order to permit rapid publication of contributions received, and to avoid the pitfalls of a series of books.

The production is up to Elsevier's usual high standard.

Patent Information Services

Aslib members may care to attend a meeting on Thursday 22nd June to learn about the services, outside the normal field of patent processing, which the Patent Office offers to information scientists and others interested in patents. Such services include the official abridgements and, more particularly, the lesser known facilities—the sale of file-lists (lists of all patents indexed under any given subdivisions of the Patent Office classification system and, in certain subject-fields, under any co-ordinate combination of terms), of punched cards, and of manuals on retrieval systems.

A DATA BANK: THE SOCIAL AND ECONOMIC ARCHIVE CENTRE*

DAPHNE GROSE

Chief Librarian, Consumers' Association

NEW forms of source material demand new centres of preservation and retrieval. Today government officials, academics and the staff of commercial organizations share an interest in the data collected by social and market research survey interviewers. Information may exist in questionnaires, in decks of punched cards, and on computer tapes that has never been fully analysed (for example data from television audience research). Other data may have been analysed, but not published. Little of this material is readily available to those who need it, and the work put into it is largely wasted. In the future, research workers wishing to construct mathematical models using past experience will curse us, if this material has not been preserved for their use.

The first steps toward creating a data bank in which to preserve this material and make it available are now being taken. In April 1966, the Third Conference on Data Archives was held in London. The hosts were members of a United Kingdom project which is still at the feasibility study stage. The other members came from the USA, Germany and the Netherlands, where data banks have reached a more advanced stage. The largest centre in the USA is the Roper Public Opinion Research Center at Williams College, which holds over 2,800 studies from thirty-nine countries. The centre at Berkeley, University of California, has American material with a sociological emphasis, and more than fifty studies from developing countries (for example, a study of three aspects of the problem of development in Africa, Asia and Latin America, including the development of educational institutions and their effect on the modernization process). The Inter-University Consortium for Political Research (University of Michigan) is a repository for recent sample survey materials with a bearing on political behaviour in the broad sense of the term, and has over fifty universities in charter membership. The most developed European Archive is the Zentralarchiv at the University of Cologne, which covers economic behaviour, political behaviour and community studies. One hundred highly sophisticated surveys which the Zentralarchiv itself has cleaned† and processed have been fully incorporated, including one for an oil company about oil consumption, which also contained questions about people's week-end travel and holiday activity. The DATUM Center at Bad Godesburg (Germany) specializes in ecological

*Based on a meeting of the Aslib Economics Group at SEAC, Wednesday 15th February 1967.

†'Clean' means complete, verified and machineable.

material. In January 1965, work began at a centre in the University of Amsterdam, which is able to accept survey materials from all parts of The Netherlands.

The projected United Kingdom centre was conceived in December 1963 when a conference was held in Cambridge, on the initiative of that University's Department of Applied Economics, to discuss the possibility of establishing a British Archive of Survey Data. A Committee was formed under the Chairmanship of Professor J. Johnson of Manchester University to undertake further investigation, and was named the Social and Economic Archive Committee (SEAC). Members of the Committee are drawn from a variety of sources—universities, research institutes, commercial firms, market research organizations and government bodies, including the Social Science Research Council. Industry and the universities have given financial help. A grant of £33,000 is being given by the Social Science Research Council.

At present the small staff of SEAC is working at PEP, but it is due to move next autumn to its permanent home as a part (an autonomous part) of the Department of Social Studies of the University of Essex.

The broad general aims of the Archive Centre have been listed as:

1 To make cleaned survey data available for further analysis;
2 To preserve valuable historical survey material;
3 To provide a centre for the training of survey research workers;
4 To provide suitable survey material for the training of research workers elsewhere;
5 To encourage improvements in survey methodology, including the standardization of some coding categories;
6 To develop and encourage sophisticated methods of secondary analysis of survey data;
7 To bring into one frame of reference studies in a particular field from all sources including market research, public opinion polling, government social surveys and studies by universities and research institutes;
8 To provide for comparative studies by improving compatibility of research undertaken in different regions and countries;
9 To prepare and disseminate a cumulative inventory of what survey data are available and can be released under specified conditions;
10 To reduce duplication of surveys, and thus save money and time;
11 To provide advice on possible future lines of research needed to fill existing gaps.

It was decided that in the first stage of the project work should be concentrated on making a start on the compilation of the inventory. Approaches have been made to universities, government departments, and consumer and industrial market research organizations. Reports of surveys have been received, and then sometimes it has been necessary to track down the research worker and his deck of cards—not always an easy task. Social and economic surveys are being discovered in many different departments of each university, for example in the geography, architecture, agriculture, sociology, education, and engineering departments. In the case of commercial organizations, whose surveys contain factual data suitable for secondary analysis, confidential parts of the survey can be deleted. For example, in a study of washing habits, the

basic habit and usage data would be available, but the columns relating to brand shares, or attitudes to particular brands might be deleted. The position with regard to government surveys is being explored. The *Family Expenditure Survey* has been offered to SEAC.

The first inventory was issued in March 1967. This indicates the origin of a survey only, and gives a brief description of its subject. Surveys are classified under very broad subject headings. Coverage is much better in some subjects than in others; transport, for example, is already well represented.

The actual data (cards and tapes) will not be taken into the Archive Centre until this has moved to Essex. One of the basic criteria for incorporation of a survey into the Archive will be that the complete raw material shall be available for each unit in the inquiry. A full set of punched cards (or tapes) must exist; where the original questionnaires (or schedules) are available their inclusion is very desirable, as often not all information obtained is transferred to the cards, and it may well be this missing information which most interests the research worker carrying out a secondary analysis of the data. Possibly the analyses and research reports and works based on the survey may finally be included in the bank. It will also be necessary to have for each survey details on the sampling procedures and general methodology.

As a first step, the Survey staff are asking people who offer data* to complete a form which asks for information about the aims of the study, the date, the geographical region of survey, methodology, sampling, key variables (age, sex, occupation, political opinion, etc.) raw material available (questionnaire, cards, tapes, tabulations), restrictions of access, and publications. When the raw material itself is received, it may be necessary in some cases for the Centre to produce clean material, and repunch cards so that the data can be machined. Some of the material offered is so damaged that it cannot be used. Some is incomplete.

In due course, the Archive Centre will have to create its own retrieval system. (It will be able to use the Essex ICT 1909 computer.) The staff have only just begun to consider this question. At present they cannot even consider answering questions about the data in the surveys beyond letting an inquirer know what surveys have been undertaken within very broad fields. In due course they hope that duplicates of packs of cards in the Centre can be made available. At the meeting it was suggested that data books should eventually be compiled, and that information could be recorded as to organizations that had undertaken a secondary analysis of material.

* Anyone who has material to offer should write to: Social and Economic Archive Centre, 12 Upper Belgrave Street, London SW1.

SOME ASPECTS OF INDUSTRIAL CLASSIFICATION IN THE SOVIET UNION

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Leverhulme Research Fellow in Soviet Engineering Production, University of Birmingham

Paper presented at Engineering Group Conference, London, Wednesday 1st February 1967

BASICALLY there are two industrial classification systems in operation in the Soviet Union: the classification of industrial documents and their related commodities, and the classification of industrial workpieces. However, these two systems exist in diverse forms. In this paper it is proposed to examine some of the codes which either have direct state approval through ministerial or All-Union research institute agencies, or have been specifically designed for standardizing component production.

1.0 Systems adopted for the classification of articles

In the planned economy of the Soviet Union, quite definite production quotas were issued until recently from the higher authority to the manufacturing enterprise. Obviously in an advanced economy of this sort the whole spectrum of goods which is required during any given planned period is enormous, and to simplify matters each manufacturing agency, whether it be regional economic council (prior to 1965) or ministry (post 1965), has a coding system for the articles manufactured by that sector.[1] The number of coding systems which exists is so great that it is impossible to outline them all. However, by examining some particular systems the general underlying principles can be shown.

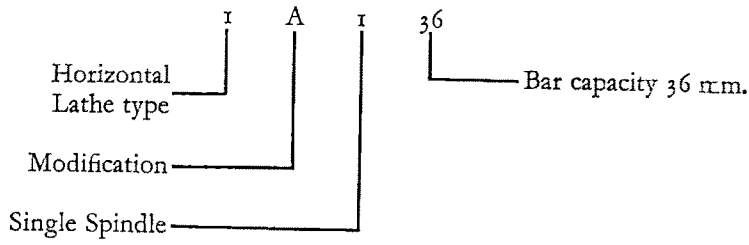
1.1 *The Machine Tool Industry Code*

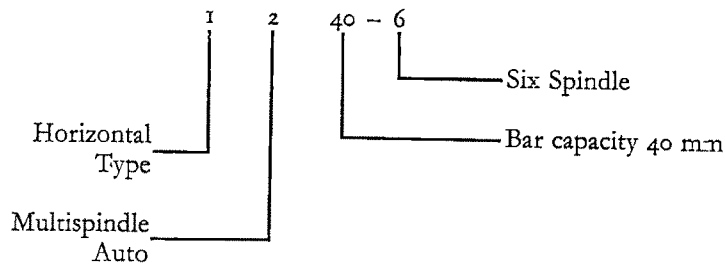
In the year 1965, 185,000 metal cutting and 34,400 metal forming machine tools were produced in the USSR.[2] Within the metal cutting machine tool section are included automatic and semi-automatic machines, gear cutting machines, grinding machines, precision machines, milling machines, boring machines, large, heavy, custom-built machines, special and machining centre type machines, automatic and semi-automatic lines, etc.[3] By examining one of the above, namely automatic and semi-automatic machines, the principles adopted by this sector of the economy will be demonstrated.

The group 'automatic and semi-automatic machines' is divided into its primary classification groups by considering whether the machine is operating in the vertical or the horizontal plane, and secondly whether the machine is automatic or semi-automatic.[4] Automated machines, of the type discussed here, are single-spindle or multi-spindle (usually four or six) machines, and the number of spindles is the next criterion in the classification scheme.

In the semi-automatic group, further subdivision is according to whether the machine is: (1) centre-type; (2) chucking; (3) turret; (4) special. The automatic group is divided into: (1) automatic cutting off machines; (2) Swiss type; (3) screwing machines; (4) bar; (5) special.

Codes which are commonly found in Soviet textbooks on automatic and semi-automatic machines, for instance, will be in the form:





Each ministry operates a code somewhat similar to that outlined, but establishes within the code those attributes which it itself considers paramount for the recognition of articles. However, with the large number of ministries in the Soviet economy, the list of coding systems is considerable. The state planning authority, GOSPLAN, in an attempt to rationalize the situation for the manufacturing industries, asked VNIINmash (All-Union Scientific Research Institute for Standardization in Engineering) in 1960 to examine the possibility of producing an all-embracing coding system for this sector of the economy.[5] A survey of eighty-seven enterprises, research bureaux, etc., showed that there was little grasp of classification (in method or theory) in those areas examined. However, this survey did bring to light that the three basic attributes a code should possess were: (*a*) that it should be in an order that would make it easy to remember the digital sequence; (*b*) that it should lend itself simply and quickly to mechanical accounting methods; and (*c*) that the nature of the article must be explicit within the code. The author of the article in which this matter was discussed, A. Ya. Gurevich, then develops a coding system (designed by VNIIStroidormash in 1960) of a form very similar to the UDC system and employing six digits.

The recommended state system (designed by the State Standards) for classification of drawings and technical documents of articles of production is GOST

5294–60.[6] Basically this standard is considered in two parts: (1) an assembly code; and (2) a description code.*

1.2 *Classification of articles and their related documents*

Assembly Code. This is a system of marking component parts of articles, i.e. parts, sub-assemblies, groups of assemblies, etc., and is a form of assembly code which refers to the article shown in the article index. It has in its complete form nine digits and a pre-fixed index. Three forms of this code exist, use depending on the complexity of the drawn article, and are shown in sections 1.1a, 1–1b, 1.1c.

1.1a U. 00. 00. 000. 00.

- 00. — Modifications
- 000. — Sub-assembly and part code.
- 00. — Group code.
- 00. — Complex group code.
- U. — Index of article.

Full scheme

1.1b U. 00. 00.

- 00. — Sub-assembly and part code.
- 00. — Group code.
- U. — Index of article

For composite article with simple groups (Structure sometimes) U 000. 000;

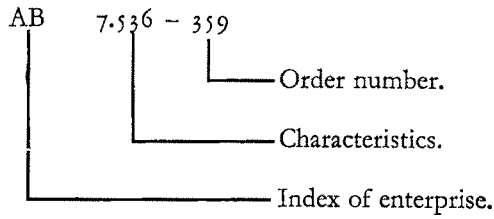
1.1c U. 900.

- 900. — Sub-assembly and part code.
- U. — Index of article

For the composite part alone.

Descriptive Code. This is a system for drawings and technical documents which may be classified using a decimal notation. The first series of digits relates to the enterprise or ministry in which the drawings or documents are produced; the second series relates to characteristics of drawing; the third relates to the order number.

* All GOSTS are related to the UDC system and 5294–60 is classified as 621(084.11).



The characteristic index 7.536 is derived from pre-determined, inter-enterprise tables of articles or parts of articles, and has a range of ten places per digit (0–9). Unlike the previous code, the characteristics relate to any article. Where this code is operating under the direct control of a central organization of an industry, some form of rationalization has taken place. State and sector standard parts are, for instance, coded with the same number. The choice of code depends on the type of final product and the component parts which are manufactured. In conditions where standardized parts are in use for a number of different products, the descriptive code is recommended. The decision as to which code to use is made by the standards section of a given enterprise, sector or industry.

From this brief description it is possible to see some of the systems in operation for the classification of industrial articles and documents, although this does not in any way exhaust the systems available. The classification of industrial workpieces or piece parts is also found in a large number of forms.

2.0 Benefits from the classification of workpieces

Prior to examining this form of classification, it is necessary to note some of the reasons for this activity, i.e. what benefits the Soviet engineers consider they get from using component classification.[7]

(i) *Standardization and variety reduction.* Standardizing parts and shape elements of parts promotes variety reduction and makes possible the unification of technological processes using Type and Group Technology.

(ii) *Design.* Classification of parts leads to a higher level of design and also reduces duplication of existing parts.

(iii) *Production and cost control.* Production and cost control is simplified, since the variety of parts in production is reduced and is related to a standard pattern of events. Determination of times for parts is made more rational.[8] It is also pre-requisite to increasing batch size in small batch and batch production and may lead to the use of mechanized and automated flow lines.[9]

With these factors in mind, it is possible briefly to examine coding systems which have been developed in the USSR since the 1930s for the classification of industrial workpieces.

3.0 Systems for classification of workpieces

3.1 *Sokolovsky Code*

During the early 1930s it became obvious to leading Soviet engineers that an increasing volume of paperwork was becoming necessary for the manufacture of any piece part. The outcome of this was that, in 1936, LONITomash

(Leningrad Section of the All-Union Scientific Engineering and Technical Committee for General Engineering) set up a special section to examine possible ways of improving production. One of the results of this work was the development of a technique known in the USSR as 'type technology', which is a simple principle of aggregating like parts which have identical or closely similar sequences of operations during the process of manufacture, and establishing a line of machines to carry out these operations. As the inventor of this technique, A. P. Sokolovsky stated in 1938: 'A great deal is known about the construction of machines, but relatively little of the role of the part in the process of manufacture'.[10, 11] Sokolovsky further stated that since the mechanical working of a part aims to give to it definite surfaces (of required form, size, accuracy, etc.), the part should be classified in a detailed form. Of the part itself the shape must be considered as the paramount feature to be classified. From this a classification scheme of fifteen classes of parts was proposed, including shafts, bushes, eccentric parts, discs, etc. (See figs. 1 and 2).

The surfaces of parts were considered in three groups:

1. *Rotational surfaces*
   - (*a*) cylindrical
   - (*b*) conical
   - (*c*) faced planes
   - (*d*) fashioned surfaces
   - (*e*) screws
2. *Rectilinear surfaces*
   - (*a*) planes (flat)
   - (*b*) sections of cylinders
   - (*c*) non-circular
3. *Complex surfaces*
   - (*a*) gear cut surfaces
   - (*b*) oval surface
   - (*c*) surfaces of more than one curve

Other attributes considered were:

- (i) mutual arrangements of processed and non-processed surfaces
- (ii) absence or presence of heat treatment
- (iii) production quantity

The code number which is shown in the classification table (figure 1) is by present standards and operating criteria very cumbersome. However, it should be noted that this code is the earliest system yet traced by this author.*

This basic system received a number of criticisms in later works, and the failure of its development is explained.[12]

It is interesting to note that at the conference at which Sokolovsky's code was discussed[13] a Soviet engineer, Aronov, proposed an elaborate decimal classification for workpieces, made up of five primary digits giving characteristics of the part and its holding positions, and two supplementary digits for the registration number of parts in an index under the given primary code.

* A code developed by Pittlers in 1926 in Central (now East) Germany has been mentioned on several occasions to the author. At the time of writing this paper no actual information is, however, available.

L.I.I.
K.T.M.

CHARACTERISTICS OF BASIC CLASSES OF PARTS [MACHINE BUILDING]

CLASSIFICATION OF ENGINEERING CONPONENTS

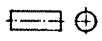
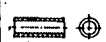
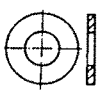
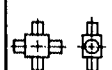
CODE	NAME OF CLASS	GENERALLY USED NAME OF PART CONSIDERED IN CLASS	COMMON SHAPE	NOMENCLATURE OF BASIC PROCESSED SURFACES	PROPORTIONALITY OF BASIC PROCESSED SURFACES	LOCATION OF AXES OF BASIC PROCESSED ROTATIONAL SURFACES	LOCATION OF BASIC PROCESSED FLATS	DISPLACED LOCATION OF AXES AND FLATS OF BASIC PROCESSED SURFACES	COMMENTS
V	SHAFTS	SHAFTS AXLES SPINDLES AXLE STUDS ROLLERS RODS JOURNALS PINS		1a EXTERNAL ROTATIONAL SURFACE 1v EXTERNAL & INTERNAL ROTATIONAL SURFACES	2a SYSTEM OF PROPORTIONING INTERNAL & EXTERNAL ROTATIONAL SURFACES 2b SYSTEM OF EXTERNAL & PROPORTIONING INTERNAL ROTATIONAL SURFACES 2v SYSTEM OF INTERNAL & PROPORTIONING EXTERNAL ROTATIONAL SURFACES	3a UNIAXIAL	—	—	THE CLASSIFICATION ALSO CONSIDERS THE [illegible]
A	BUSHES	BUSHES AXLE BOXES SLEEVES		1v EXTERNAL & INTERNAL ROTATIONAL SURFACES 1a INTERNAL ROTATIONAL SURFACE	2a SYSTEM OF PROPORTIONING INTERNAL & EXTERNAL ROTATIONAL SURFACES 2b SYSTEM OF EXTERNAL & PROPORTIONING INTERNAL ROTATIONAL SURFACES 2v SYSTEM OF INTERNAL & PROPORTIONING EXTERNAL ROTATIONAL SURFACES	3a UNIAXIAL	—	—	[illegible] – DEVIATION OF AXES – SPACING CHARACTERISTIC 3) 7a 7b 7v – SIZE OF TRANSVERSE SECTIONS 3) 8a 8b 8v – LENGTH
D	DISCS	DISCS WHEELS RING FLYWHEELS CURVED COVERS HUBS PULLEYS NOSES FLANGES		1g EXTERNAL & INTERNAL ROTATIONAL & FLAT SURFACES 1a EXTERNAL ROTATIONAL AND FLAT SURFACES	2a SYSTEM OF PROPORTIONING INTERNAL & EXTERNAL ROTATIONAL SURFACES 2b SYSTEM OF EXTERNAL & PROPORTIONING INTERNAL ROTATIONAL SURFACES 2v SYSTEM OF INTERNAL & PROPORTIONING EXTERNAL ROTATIONAL SURFACES	3a UNIAXIAL	—	—	EXAMPLE OF PART CODE THE PART IS MARKED WITH CODE IN THE FORM OF A FRACTION. THE NUMERATOR DEMONSTRATES THE NAME OF THE ATTRIBUTES OF THE PART SUMMARIZED AND THE DENOMINATOR THE ATTRIBUTES OF ITS SEPARATE BASIC PROCESSED SURFACES.
E	ECCENTRIC PARTS	ECCENTRIC DISCS CRANKSHAFTS ECCENTRIC SHAFTS		1a EXTERNAL ROTATIONAL SURFACE 1b INTERNAL ROTATIONAL SURFACE 1v INTERNAL & INTERNAL ROTATIONAL SURFACES 1g INTERNAL & INTERNAL ROTATIONAL & FLAT SURFACES	2a SYSTEM OF PROPORTIONING INTERNAL & EXTERNAL ROTATIONAL SURFACES 2b SYSTEM OF EXTERNAL & PROPORTIONING INTERNAL ROTATIONAL SURFACES 2v SYSTEM OF INTERNAL & PROPORTIONING EXTERNAL ROTATIONAL SURFACES	3b GROUP WITH PARALLEL AXES	—	—	EXAMPLE 1 70 ø 1000 V. 1a. 3a. 7b. 8v. N. 1b. 7b. 14n.
K	CASTINGS	CASTINGS TEE-PIECES VALVE BODIES BODIES HOUSINGS		1b INTERNAL ROTATIONAL SURFACE 1v INTERNAL & INTERNAL ROTATIONAL SURFACES 1g EXTERNAL & INTERNAL ROTATIONAL & FLAT SURFACES	2a SYSTEM OF PROPORTIONING INTERNAL & EXTERNAL ROTATIONAL SURFACES 2b SYSTEM OF EXTERNAL & PROPORTIONING INTERNAL ROTATIONAL SURFACES 2v SYSTEM OF INTERNAL & PROPORTIONING EXTERNAL ROTATIONAL SURFACES	3v AXES INTERSECTING ON PLANE 3g GROUP WITH PARALLEL & INTERSECTING AXES	—	—	EXAMPLE 2 32ø 200 400
R	LEVERS	LEVERS SWINGING RODS CRANKS LINK BARS ROCKER ARMS		1d INTERNAL ROTATIONAL AND FLAT SURFACES 1g EXTERNAL & INTERNAL ROTATIONAL & FLAT SURFACES	—	3a UNIAXIAL 3b GROUP WITH PARALLEL AXES 3v AXES INTERSECTING ON PLANE 3g GROUP WITH PARALLEL & INTERSECTING AXES	—	—	

FIGURE 1

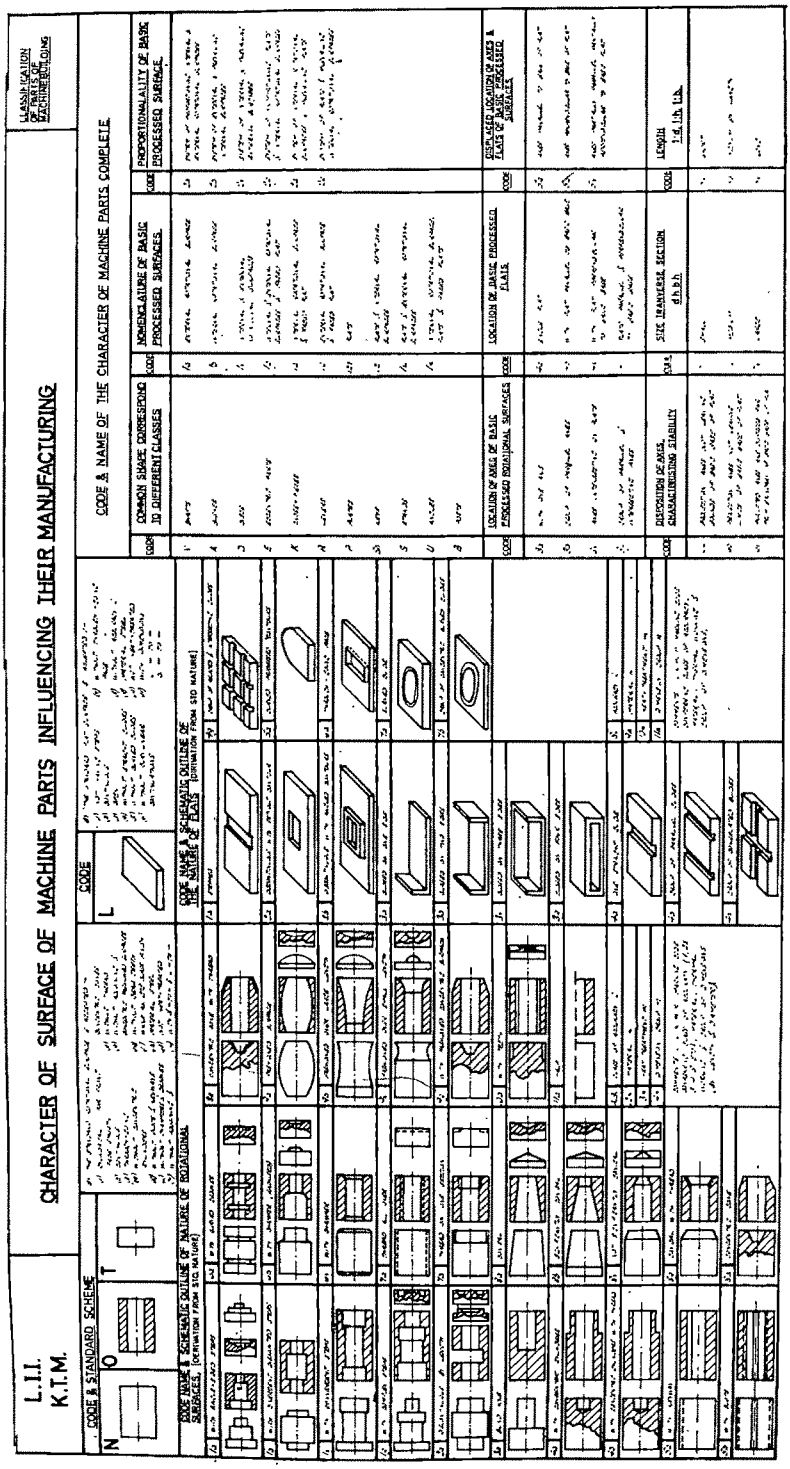

L.I.I.
K.T.M.
CHARACTER OF SURFACE OF MACHINE PARTS INFLUENCING THEIR MANUFACTURING
CLASSIFICATION OF PARTS OF MACHINE BUILDING
CODE & STANDARD SCHEME
N
O
T
CODE
L
CODE & NAME OF THE CHARACTER OF MACHINE PARTS COMPLETE
CODE NAME & SCHEMATIC OUTLINE OF NATURE OF ROTATIONAL SURFACES, (DERIVATION FROM STD. NATURE)
CODE NAME & SCHEMATIC OUTLINE OF THE NATURE OF FLATS (DERIVATION FROM STD NATURE)
COMMON SHAPE CORRESPOND TO DIFFERENT CLASSES
NOMENCLATURE OF BASIC PROCESSED SURFACES
PROPORTIONALALITY OF BASIC PROCESSED SURFACE
LOCATION OF AXES OF BASIC PROCESSED ROTATIONAL SURFACES
LOCATION OF BASIC PROCESSED FLATS
DISPOSITION OF AXES, CHARACTERISTING STABILITY
SIZE TRANVERSE SECTION
LENGTH

FIGURE 2

Although Sokolovsky's classification system was severely criticised, the principles of type technology were developed rapidly and used in many factories in the USSR, especially in the Leningrad region. It was during this development period that Mitrofanov began work on the application of group technology.

One of the basic faults of type technology is that with small batches the frequency of resetting of the type machine organization is critical, and may reduce the economic effectiveness of the system. Mitrofanov examined the effect of frequent occurrence of very small batches and one-off production. He concluded that by examining and grouping parts which had a like configuration and were completely or almost completely manufactured on one machine, an improvement could be made economically on existing methods. He also advocated a system of fixtures on each machine, so that resetting times could be drastically reduced.

The system used for classification was contrary to Sokolovsky's, who had initially examined the part to determine the machine, whereas Mitrofanov initially examined the machine to determine the parts.[14]

3.2 *Mitrofanov System*[15]

Parts are originally divided into groups according to the machines on which they are completely or almost completely made, e.g. automatics, turrets, lathes, milling machines, etc. The second stage is to place all those parts which are manufactured completely on one machine apart from those which require a second or third individual operation, and those which require processing on several machine tools.* The initially grouped parts are then examined and classified according to the following attributes:

(*a*) size of part—which will determine the size of equipment
(*b*) shape of part—which will determine the holding of the part and supply information for the design of fixtures
(*c*) the surface frequency—which will determine the number of separate or combined cutting tools
(*d*) accuracy and finish—which will determine the grade of machine and cutting tool
(*e*) batch sizes (from yearly programme)—which will determine the load on equipment
(*f*) economics of the process—which will determine whether the process needs to be varied

Whether this system was actually coded, and if so whether the code is used in production and cost control is not stated in works on the method; the author is of the opinion that this classification scheme is only in use in the production planning department and that parts are known in the factory by their part or drawing number.

* Figures available from the Type Technology Conference (ref. 11, p.77–) in 1938 suggest that the following conditions prevail in Soviet industry

Parts requiring	one	operation		—46%
,,	,,	two	,,	—28%
,,	,,	three	,,	—26%

Mitrofanov, who is director of the Leningrad Institute of Precision Mechanics and Optics, has since developed a coding system to be used with punched card machines for establishing groups. However, before examining this it would be advantageous to examine a system which the author believes has affected Mitrofanov's thought on classification.

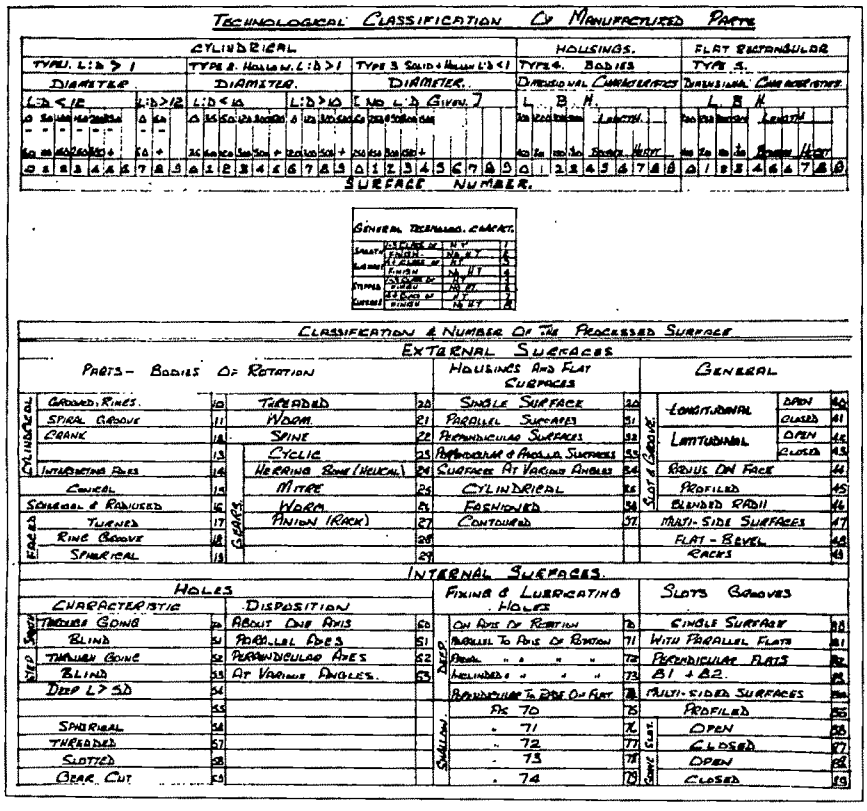


FIGURE 3

3.3 *The VPTITM* System*[16]

Fig. 3 shows the whole scheme for this type of classification. Parts are initially subdivided by their geometric form, and the code requires five digits (1–5).

(1) solid cylindrical parts L : D > 1
(2) hollow cylindrical parts L : D > 1
(3) solid and hollow cylindrical parts L : D < 1
(4) housings, L, D, H.
(5) flat, straight, figured, L : D : H.

Secondly, the dimensional range is defined (groups 1, 2, 3)–D or (groups 4, 5)–L, D or B.H. Thirdly, the technical characteristics of the part are considered (digits 1–8) showing smooth or stepped surface, the class of accuracy level

* The All-Union Design and Technological Institute for Heavy Engineering.

(1st–3rd and 4th and over) and whether the part is heat-treated or not. From the above information the first three digits are determined and show the basic surface and technological characteristics. Within the code further information on the external and internal surfaces is shown.

Digits 10–29 refer to bodies of rotation
30–39 housing and flat surface
40–49 general for bodies of rotation and housing and flat bodies
→ External surface

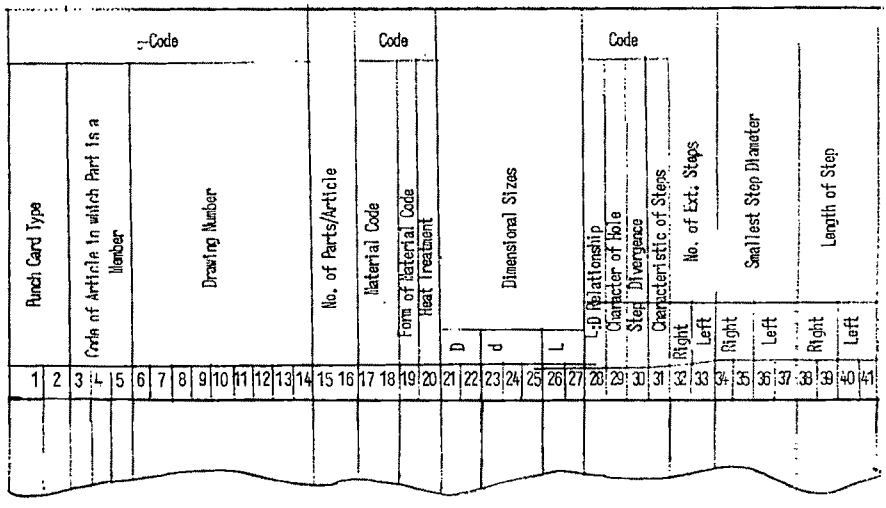
50–59 hole characteristics
60–69 hole position
→ Internal surface

70–79 fixing holes characteristics
80–89 flat int. surfaces, grooves, etc.
→ Supplementary external characteristics.

The number of attributes that the part displays determines the number of digits used and the length of the code.

To relate drawing numbers to the new code number two reference sheets are necessary. The first gives the code number which the drawing receives after classification whilst the second gives for each code number the drawing numbers to which it is related. Mitrofanov in his recent (1965) work[17] criticises this scheme as useful only in the context of type technology; it does not assist in the

FIGURE 4 TYPE OF PUNCHED CARDS



standardization of parts and processes and it is insufficiently detailed to give impetus to the introduction of group technology.

3.4 *The LITMO* scheme for Classification using Punched Cards*[17]

3.41 *General characteristics*

The steps of the LITMO classification are as follows:

1. Information relating to parts is transferred from the drawing to a punched card table (fig. 4) which has eighty columns and twelve rows. Information is primarily sorted for parts which are by definition of shape 'curved' or 'flat'. This step is carried out manually and is obviously a weakness of the system, since mistakes might be made in transferring so much information. The card when it is completed is passed to the next step.
2. transfer from table on to punch card
3. check the punchings, in a verifying machine
4. design sorting schemes for definite attributes
5. sort
6. print out (as shown in fig. 5).

Using this scheme it is possible to sort against different attributes simply and effectively. This type of system has the added advantage that it is possible to carry out separate analyses of attributes, should a new machine be required or certain products fall off and new ones take their place.†

3.42 *Necessary requirements for coding*

A standard punched card is used in this operation, and so for each column (eighty in all) there is a range of 0–9 digits variations which may be employed.

* Leningrad Institute of Precision Mechanics and Optics.

† This classification was developed jointly by LITMO engineers and a central computing station.

AND CODING TABLE OF CURVED PARTS

No. of Int. Steps		Largest Int. Diameter				Class of Accuracy		Smallest Wall Thickness	Code																													
									Special Forms of Surface											Character of Flat Surface										Non-Central Hole								
Right	Left	Right		Left		Int.	Ext.		Thread	Eccentric	Knurled	Rifled	Fashioned	Spherical	Conical	Facial Groove	Scrolled Groove	Ringed Groove	Lug and Fork	Longitudinal Projection	Cut Surfaces	Longitudinal Open Flat	Longitudinal Half Closed & Closed Flat	Closed Scrolled Groove	Radial Flat	Lateral Flat (Ports)	Inclined Flats and Ports / Flat on Steps, Bevelled	Inclined Faces	Highest Class on Flat Surface	Multi-Stepped with Thread	Multi-Stepped without Thread	Single Stepped with Thread	Single Stepped without Thread	Conical Hole	Inclined Holes	Highest Class on Hole	Form of Gear Meshing	Special Working
42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80

FIGURE 5 TABLE OF CLASSES OF CURVED PARTS

6		No. of Drg.	Step Form	Charact. of Hole	L/D.	Step Charact.	No. of Steps (Ext.) Right	No. of Steps (Ext.) Left	Thread	Diam. (Ext.)	Diam. (Int.)	Code Part According to Mark for Curved Parts		
Punch Hole Column		11, 12 13, 14	30	29	28	31	32	33	51	21 22	23 24			
No Hole	0.2 L/D 0.4	202	2	0	2	1	20		4	36	00	Thread		Groove Only
	0.4 L/D 0.6	324	2	0	3	0	20		0	9	00	No Thread	Two Steps	Open Step and Groove Absent
		236	2	0	3	0	20		0	14	00	No Thread		
		252	2	0	3	0	20		4	9	00	Thread		
		355	2	0	3	0	30		4	10	00	Thread	One Step	
		298	2	0	3	1	20		0	12	00	No Thread	Two Steps	Groove Only
		108	2	0	3	1	20		4	8	00	Thread		
	0.6 L/D 1	233	2	0	4	0	10		4	4	00		One Step	Open Step and Groove
		218	2	0	4	0	50		4	9	00		Two Steps on Right	
		118	2	0	4	0	20		4	6	00			
		373	2	0	4	0	20		4	3	00			
		85	2	0	4	0	20		4	4	00			

However, three problems must be solved before the scheme can be operational. These are:

1. all code characteristics of the part must be placed in a numerical form;
2. the systems which are developed must lend themselves to manipulation by the sorting machines, and it should be possible to:
   (*a*) determine various subordinated (secondary) attributes of the principal attributes and by this proceed to realistic variants of the classification;
   (*b*) execute the sorting of the punched cards from 'lowest to highest' attribute associated with a strict subordination of these attributes.
3. since the coding of drawings is the most time-consuming operation, the labour content of this stage must be at the lowest possible level.

3.23 *The choice of coding systems*

As in all coding systems the choice of parameters should be objective and should fulfil the largest possible number of requirements (although it is unrealistic to attempt to classify all variants that exist). An order of desirability of attributes should be determined and from this the system may be developed. Limitations concern the distribution of digits so that major and secondary attributes are catered for adequately. Coupled with this is the placing of parts into definite classes, groups, etc., which will be fully meaningful. These difficulties can only be overcome by employing a highly trained technologist, who not only has knowledge of the piece parts being manufactured in any given enterprise or sector of industry, but is conversant with punched card manipulation.

3.24 *The choice of data to be coded*

(1) *Curved parts*

The initial information to be coded (in this eighty-digit classification), after recognition of a curved part, is that which relates to the article in which the workpiece is an integral part. In many cases articles are defined using an alphabetic code and obviously this is not a convenient form of code in the punched card system. A conversion table is required, when this situation occurs, for translating the alphabetical code into a numerical form. The number of the part itself has an allocation of seven primary digits plus two secondary digits (for modifications) and where letters exist they are translated into a numerical form. The batch size quantities are vital in the determination of group technological layouts, and are therefore catalogued in the early columns of the code (columns 15 and 16).

The other attributes considered in this system can be conveniently examined in the two forms 'qualitative and quantitative'.

Qualitative form. Columns 17; 18; 19; 20 are related to the material (two digits), material shape, and heat treatment respectively. The material code 00–99 covers a wide range of materials specifications from the ferrous and non-ferrous group of metals to polymers and fibrous materials, e.g. 01 is carbon steel 20 and 83 is polyethylene. In the original text each of these digits or pairs of digits has a code table.

The relationship of length to diameter, characteristics of the steps and their

disposition, and characteristics of the holes are also given in this form.

Further qualitative characteristics are conveniently divided into: (*a*) special forms of surfaces (columns 50–60); (*b*) surfaces of a flat characteristic form (columns 61–71); and (*c*) non-central holes (72–80). Also coded is the highest class of accuracy required of all surfaces. For each characteristic a table or code chart exists in which combinations of different surfaces or attributes of surfaces are shown, using digits 0–9 (see figures 6–10 for example).

Quantitative form. Unlike other codes, for instance the VPTI code, the dimensions of the articles are given in actual discrete numbers and columns, e.g. 21–22 give outside diameter, 23–24, the inside diameter and 25–27 the maximum length. From the digits available it is obvious that the maximum diameters are 99 mm. and length 999 mm. The probability of parts being greater than this is quite low in the industry for which this code was designed. Nevertheless, where dimensions are above the maximum then they are coded as the maximum, i.e. greater than 99, read 99, etc. The remaining digits relate to the steps on the external and/or the internal surfaces, and are given for the left- and right-hand side of the component. Within this group of characteristics are: the number of external and internal steps, the smallest diameter of the external stepped surface, and the largest diameter of internal steps.

(2) *Flat parts*

For flat parts, the layout of the punched card is similar to that described above. However, there are obvious differences in the number of digits used for dimensional size, and the relationship between the processed and non-processed surfaces needs closer definition.

3.45 *Method of classifying (grouping parts)*

The sorting plan once designed for a given set of variables is simply carried out by a method of successive approximations, producing an outline general group, and then refining this information by the selection of attributes within the scheme. Two relationships exist between the major and the secondary attributes, which results in: (1) the classification of each step being fulfilled according to identical attributes; and (2) the classification being determined in

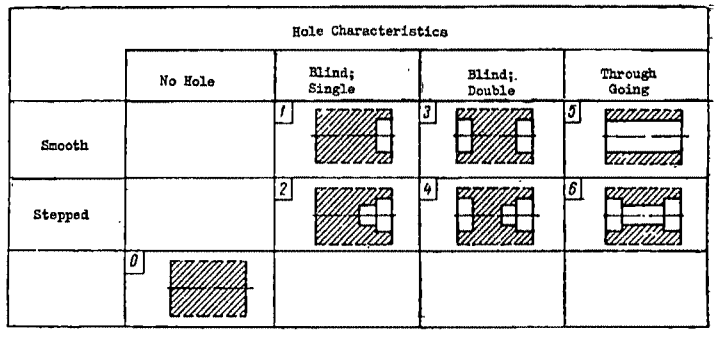


FIGURE 6

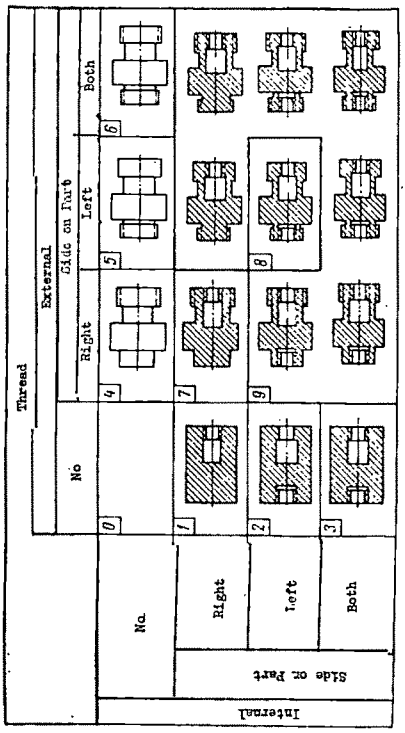


FIGURE 8

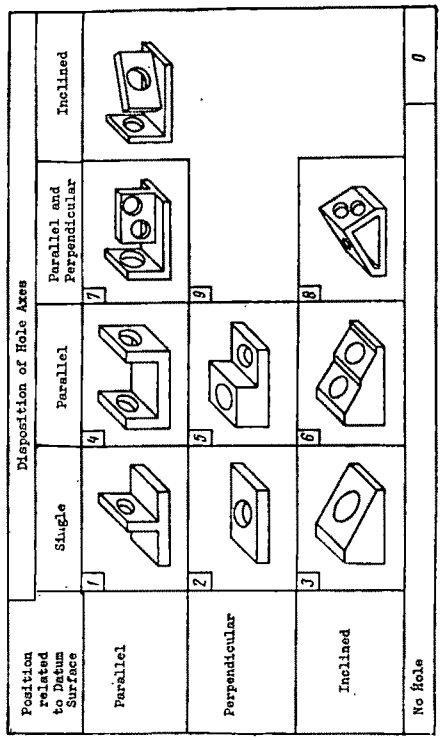


FIGURE 10

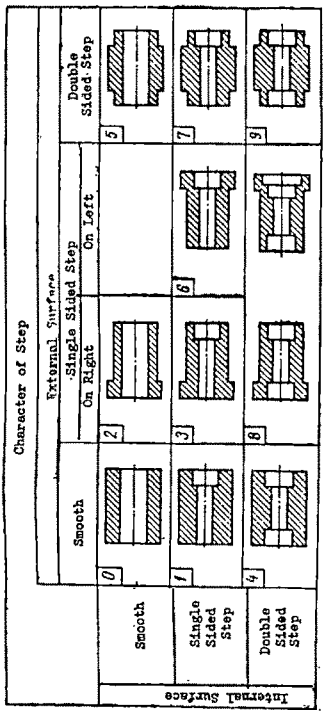


FIGURE 7

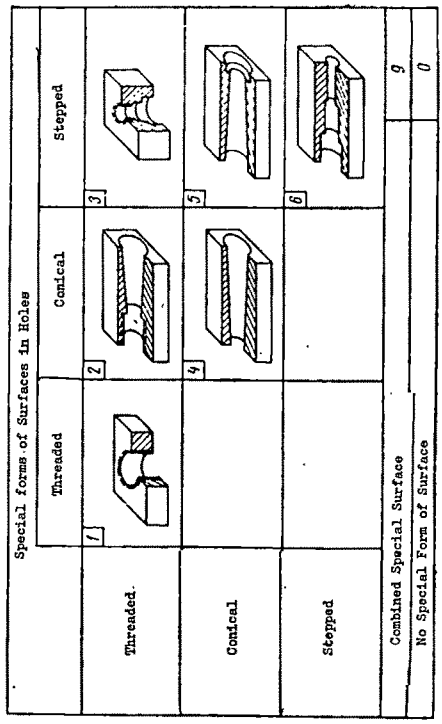


FIGURE 9

definite steps according to various attributes. In the first case all cards or drawings would be placed in sets by major attribute, whilst in the second the same rule would apply for the primary division, but the secondary and tertiary levels, etc., would be examined against definite attributes for each classified group.

In examining complex, turned, curved parts the major quality of the code to be examined is step divergence (column 30), followed by the subordinate characteristics, hole characteristics (column 29) and so on. This eventually gives a 'read out', similar to that shown in fig. 5, in which parts are defined from the most simple to the most complex, according to the selected attributes.

Some notes on the LITMO coding

Definitions in classification should be made as explicit as possible, so that coding can be carried out with no ambiguity of term. With a coding system as complex as this obviously definitions must be sound. To illustrate this point in the LITMO code let us consider the orientation of the part prior to coding, i.e. how best to set up the part to obtain clear coded data. Parts (curved with hole) are placed so that the right-hand side has either:

1. a blind hole.
or 2. (with two blind holes) the largest step diameter.
or 3. (a through-going hole) the exit diameter with the largest number of half-closed steps.
or 4. (with equal number half closed steps on a through going hole) the exit step with the largest diameter.

The formation of steps which can exist are infinite and only a general principle is possible. A step is defined, on curved surfaces, as a discrete change of diameter (except a groove) or a continuous change in diameter (as in a cone or sphere) or formed with a flat surface, with a limited change of diameter (as in a milled square on a round shaft). The difference between a groove and a step is that a groove is defined as 'a hollow depression' (in a step) where the width is less than or equal to 5 mm. and/or not more than 0.2 of the length of the part. Other characteristics which are so defined are face grooves and spiral grooves.

The step itself must also be defined further to reduce the variety of steps characteristics which can exist, e.g. closed step, open step, and half-closed step.

LITMO system concluded

With the appearance of this system, obviously those people working in the field of group technology and related fields will have to spend some time examining it in detail and if necessary carrying out some form of comparison with the GT codes which have recently been designed in Germany. My recent visit to the USSR, where I met S. P. Mitrofanov, showed that the system is in a very early stage of development, and that much work is being carried out by V. A. Petrov[18] to determine the principles of efficient planning and cost control to complement the system.

In the Soviet situation where control is highly centralized, it would seem that there is nevertheless a large number of codes in use, which does not seem compatible with the idea of an ordered system. However, with the range of

industry and the stress placed by different managerial groups on the attributes to be coded and on the order of this code, perhaps such diversity is not so out of place.

REFERENCES

1 In the work by A. A. Kokhtex, *Tekhniko-Ekonomicheskie Standartizatsiya v Mashinostroenii* (Moscow 1963) the author states that there are more than twenty classification schemes in operation by Ministries and Institutes.
2 SSSR v tsfrakh v 1965 godu TsSU. SSSR, 1966. p. 58.
3 *Ekon. Ents. Prom. i Stroit.* Tom. 3, p. 179, 1963.
4 BOGUSLAVSKY, B. L. *Automatic and semi-automatic lathes.* Peace Publishers, Moscow, pp. 19 and 37.
5 GUREVICH, A. YA. Klassifikatsiya mashinostroitelnoi produktsii. *Standardizatsiya,* 7 (11) 1961, 7–12.
6 *GOST* 5294–60. Sistema chertezhnogo khozyaistva oboznachenie chertezhei i drugikh tekhnicheskikh dokumentov izdelii osnovogo proizvodstva. Gosudarstvenhoe Izdatelstvo Standartov. Moscow. 1961.
7 MITROFANOV, S. P. Nauchnye osnovy tekhnologicheskoi podgotovki gruppovogo proizvodstva, Mashinostroienie, M. 1965, p. 5.
8 See also recent British work: Planning and ratefixing system making extensive use of synthetic times, *Machinery and Production Engineering,* September 28, 1966.
9 PETROV, V. A. Planirovanie potochno-gruppovogo proizvodstva, Mashinostroenie, M. 1966.
10 SOKOLOVSKY, A. P. Trudy Leningradskoi Konferrentsii po Tipizatsii Technologicheskikh Protsessov, NKTP, SSSR, 1940.
11 SOKOLOVSKY, A. P. Problema Tipizatsii Technologicheskikh Protsessov. ONTI. NKTP. SSSR. 1938.
12 DEMYANYUK, D. S. Technological principles of flowline and automated production, Pergamon Press, 1963. 2 vols.
13 SOKOLOVSKY, A. P. *op. cit.,* p. 17—.
14 MITROFANOV, S. P. Scientific principles of group technology, translated and published by National Lending Library 1966 (3 vols.) p. 6, Vol. 1.
15 MITROFANOV, S. P. *op. cit.,* p. 19.
16 For a detailed examination see E. I. Yarkho, Standardization of technological processes in the manufacture of machinery. *Russian Engineering Journal,* 42(8) 1962, 39–47. (Published by PERA.)
17 MITROFANOV, S. P. *op. cit.,* p. 23.
18 PETROV, V. A., *op. cit.,* p. 17—.

Since writing and presenting this paper I have revisited the Soviet Union and discussed the question of industrial classification with several leading Soviet experts in this field. These discussions revealed that some recent and important aspects of Soviet industrial classification had not been considered in the paper. For instance, at NIITmash (The Scientific Research Project-Design Institute for the Technology of Machine-building) the section working on Group Technology has produced a completely new classification system (Metodika klassifikatsii detalei izdelii mashinostroitel'nogo zavoda. RTM 4.29.003. Ts.B.T.I. Leningrad, 1965), in an attempt to bridge the two basic systems outlined in the text. I believe that this is one of the most important classification systems employed by Soviet industry and is the result of extensive research work on all the major systems employed, especially Brisch, Opitz, and a new universal industrial system devised by the Higher Polytechnical School at Karl Marx Stadt (East Germany). Coupled with this is the present research in the USSR to develop a universal industrial system. These and other points I will discuss in a supplementary article to be published in the near future.

Research Note

COMPUTER-AIDED TYPESETTING

The following report from the Aslib Research Department outlines one aspect of the Department's work during the past year. It is appropriate to describe the progress made so far, because the first stage of the experimental work is now complete. Subsequent work will be described more fully when completed.

For the past year experimental work on computer-aided typesetting has been going forward in the Aslib Research Department. The Department's interest in this originated with the study undertaken for the Institution of Electrical Engineers on the feasibility of producing *Physics Abstracts* with the aid of a computer. The later stages of the project, however, have been supported by the Research Department itself.

The original emphasis of the study was on the problems involved in the typesetting of an abstracts journal by computer. In order to begin with fairly simple tasks, it was decided to attempt the computer typesetting of a sample of author index material, and to deal next with a titles list somewhat resembling the material in the IEE publication *Current Papers in Physics.*

As a result of some previous computer work done for a vocabulary study, a suitable sample was available of authors and titles, with abstract numbers taken from the 1965 volume of *Physics Abstracts.* The material was in the form of IBM cards, in the format required for input to standard IBM KWIC programs. In order to avoid the necessity for additional data preparation, it was decided to write the computer programs so as to be able to use these cards for input. Fig. 1 shows part of the data; one line of the list represents the contents of one card.

At the beginning of the work it was not clear on what computer the programs would eventually be run. In order to keep some flexibility in this respect, it was decided to write them in COBOL, a high-level language which is at least partly independent of any particular model of computer. Another reason for using COBOL was that it is comparatively simple to learn, write and understand, and it was considered that this should reduce the time required for developing the programs. In the event, these reasons for using COBOL have been well borne out.

The typesetting machine on which the results were to be run was the Lumitype 713 'Textmaster', a fairly fast photocomposer which is suitable for material such as journals and newspapers. The use of such a machine was made possible through the kind co-operation of Southwark Offset Limited. The programs were tested on an English Electric KDF8 computer at the company's service bureau at Kidsgrove. This bureau has long experience of the use of COBOL, and its staff were able to help Aslib staff considerably, especially in the early stages.

This experimental work is now complete. Programs have been written and tested which read the cards and produce paper tape which can be used to

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6519734    201THE DECAY OF A PLASMA ALONG A MAGNETIC FIELD.
6519735    101DETHLEFSEN R
6519735    201THE ELECTRICAL CONDUCTIVITY OF M.H.D.-PLASMAS.
6519736    101DRAWIN H W          FUMELLI M
6519736    201SPECTROSCOPIC MEASUREMENT OF PLASMA ROTATION IN A PENNING
6519736    202  DISCHARGE.
6519737    101AGOSTINELLI C
6519737    201THE FUNDAMENTAL EQUATIONS OF COLLISION WAVES IN MAGNETO GAS
6519737    202  DYNAMICS.
6519738    101VUJNOVIC V
6519738    201BEHAVIOUR OF THE FIRST BALMER LINES IN A HIGH DENSITY
6519738    202  PLASMA.
6519739    101HEDVALL P           SJORGEN L
6519739    201INFLUENCE OF COLLISIONS ON WHISTLER PROPAGATION.
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FIGURE 1. EXTRACT FROM THE DATA

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*T*HE DECAY OF A PLASMA ALONG A MAGNETIC £ELD. **A*BS. 19734***
*T*HE ELECTRICAL CONDUCTIVITY OF *M*.*H*.*D*. -PLASMAS. **A*BS. 19735***
*S*PECTROSCOPIC MEASUREMENT OF PLASMA ROTATION IN A PENNING**
  DISCHARGE. **A*BS. 19736***
*T*HE FUNDAMENTAL EQUATIONS OF COLLISION WAVES IN MAGNETO GAS**
  DYNAMICS. **A*BS. 19737***
*B*EHAVIOUR OF THE £RST BALMER LINES IN A HIGH DENSITY PLASMA.**
  **A*BS. 19738***
*I*N*£*UENCE OF COLLISIONS ON WHISTLER PROPAGATION. **A*BS. 19739***
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FIGURE 2. PROOF LIST AS PRINTED BY THE COMPUTER

Boundary layer problems in plasma physics. Abs. 19719
Short range forces in the kinetic theory of weakly ionized plasma and electrolytes: Abs. 19720
Numerical study concerning the fokker-planck operator. Abs. 19721
Comment on "pline dependence of the two-particle correlation function in a one-component plasma. Abs. 19722.
Reply to comments by R.L. guernsey. Abs. 19723
On the possibility of birefringence in a moving plasma. Abs. 19724
Dependence of the population density of hydrogen levels on the number of bound states in stationary non-thermal plasmas. Abs. 19725
Calculation of the thermodynamic properties of partially ionized hydrogen, taking account of the electrostatic interactions. Abs. 19726
A virial theorem for plasmas. Abs. 19727
Kinetic theory of plasma. Abs. 19728
Method of integration of the boltzmann equation in the presence of spatial gradients. Abs. 19729
Bivariate distribution function for a plasma in a magnetic field. Abs. 19730
Comments on "phermoelectric effects in a joule-heated plasma". Abs. 19731
Dominant and non-dominant terms in the energy transfer equations for a fully ionized plasma. Abs. 19732
Motion of plasmoids in field free space. Abs. 19733
The decay of a plasma along a magnetic field. Abs. 19734
The electrical conductivity of M.H.D. plasmas. Abs. 19735
Spectroscopic measurement of plasma rotation in a penning discharge. Abs. 19736
The fundamental equations of collision waves in magneto gas dynamics. Abs. 19737
Behaviour of the first balmer lines in a high density plasma. Abs. 19738
Influence of collisions on whistler propagation. Abs. 19739
Anomalous microwave transmission through a xenon plasma at the electron cyclotron frequency. Abs. 19740
Concerning the measurement of electron temperatures by comparing the intensities of helium lines. Abs. 19741
Measurement of the faraday effect in a theta-pinch plasma using a he-ne laser. Abs. 19742
A moving mirror laser interferometer for plasma diagnostics. Abs. 19743
Determination of cesium discharge plasma parameters by ultrahigh-frequency method. Abs. 19744
Temperature measurements in a hot plasma of known composition. Abs. 19745
The investigation of plasmoids using fast particle beams as probes. Abs. 19746
Errors in magnetic probe measurements. Abs. 19747
Plasma diagnostics by non-linear resonant-angle scattering. Abs. 19748
Application of hollow probes to the study of electric discharges in gas. Abs. 19749
The investigation of the properties of plasma in crossed electric and magnetic fields. Abs. 19750
Perturbations of particle motion in stellarator. Abs. 19751
Preliminary results on electron acceleration mechanism in the slow theta pinch. Abs. 19752
Generation and investigation of high density magnetically compressed plasmas. Abs. 19753

FIGURE 3. THE TEXT AS PRODUCED ON FILM BY THE COMPOSING MACHINE (Note: For technical reasons, the text is shown white on black above. In normal practice it would appear black on white.)

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190077 FONI.
190080      ADD 1 TO WBC, ADD 1 TO TBC.
190090      MOVE "£" TO WOBUCH (WBC), MOVE LIGATURE TO TABUCH (TBC).
190100      ADD 8.5 TO WORDWIDTH, MOVE ZERO TO FSWITCH, GO TO LKEXIT.
190110 FONEL.
190120      ADD 1 TO WBC, ADD 1 TO TBC.
190130      MOVE "*" TO WOBUCH (WBC), MOVE SHIFT TO TABUCH (TBC).
190140      ADD 1 TO WBC, ADD 1 TO TBC.
190150      MOVE "£" TO WOBUCH (WBC), MOVE LIGATURE TO TABUCH (TBC).
190160      ADD 1 TO WBC, ADD 1 TO TBC.
190170      MOVE "*" TO WOBUCH (WBC), MOVE UNSHIFT TO TABUCH (TBC).
190180      ADD 8.5 TO WORDWIDTH, MOVE ZERO TO FSWITCH, GO TO LKEXIT.
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FIGURE 4. EXTRACT FROM THE PROGRAM

drive a 'Textmaster'. The programs also produce a proof list on the line printer.

Examples of the results are shown in Figs. 2 and 3. Fig. 2 shows the proof list which is printed by the computer. This is line for line as it will appear in the final typeset result. The asterisks represent shifts and other typographical controls. These are all inserted automatically by the program, since the punched cards contain no typographical information at all.

Fig. 3 shows the final result produced on film by the composing machine. The choice of line length and point size was arbitrary; the program will accommodate other dimensions equally well. The right-hand margin was left ragged, since justification was not felt to be necessary for this kind of material. It could be achieved, however, with little extra trouble.

It was felt that the problems of hyphenation should be avoided as far as possible. Other workers have spent much time in trying to improve their automatic hyphenation routines, but for material of utilitarian rather than literary value it was considered that the advantages to be gained would not be commensurate with the amount of work involved. Some form of hyphenation was necessary, however, since the material contained a large proportion of long words. An extremely simple method was adopted, which has not given rise to any blatantly bad word-breaks in the sample used.

It will be seen readily that the results from the composing machine are far more legible and at the same time far more economical of space than computer print-out. It seems that if suitable computer programs could be made generally available, the appearance and readability of computer-produced reference publications, such as catalogues, could be greatly improved. Further research is being planned on the cost and practicability of producing by computer a reference publication which is at present produced by conventional means. It is hoped that by the end of this project a useful amount of knowledge will have been gained on both the technical and the economic aspects of this new method.

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J. DAVIS

SELECTIONS FROM THE RECENT LITERATURE

ALL ITEMS listed may be borrowed from the Aslib Library, except those marked *, which may be consulted in the Library.

Books and Pamphlets

AMERICAN FEDERATION OF INFORMATION PROCESSING SOCIETIES
AFIPS conference proceedings, volume 29: 1966 Fall Joint Computer Conference. Washington, Spartan Books; London, Macmillan, 1966. viii, 819 p. tables, diagrs. £8 8s.

KUNEY, J. H., *and others*. Computerized typesetting of complex scientific material.
KUNKEL, G. Z. Computer-assisted page composing system featuring hyphenless justification.
MARKIS, C. J. Special purpose computer for high-speed page composition.
NEBEL, B. E. Multiprogrammed teleprocessing system for computer typesetting.
PERRY, J. H. Integrated automation in newspaper and book production.

*AMERICAN LIBRARY ASSOCIATION *and others*
Anglo-American cataloging rules. North American text. Chicago, American Library Association, 1967. xxi, 400 p.

*AMERICAN SOCIETY FOR TESTING AND MATERIALS
CODEN for periodical titles. Philadelphia, Pa., A.S.T.M., 1967. 2 vol. (ASTM Data Series DS 23.) $85.

ASHWORTH, WILFRED, *ed.*
Handbook of special librarianship and information work. 3rd ed. London, Aslib, 1967. 624 p.

ASSOCIATION OF ASSISTANT LIBRARIANS
A British view of libraries in the USA and the USSR: reports of the AAL study tours of libraries in the United States of America and the Soviet Union. London, the Association, 1965. vi, 80 p. diagrs. 37*s* 6*d*.

BAHN, GILBERT S.
A documentation-oriented special technical journal. Van Nuys, Calif., Marquadt Corp., 1966. [13] p. $1.

*BAKEWELL, K. G. B.
How to find out: management and productivity: a guide to sources of information arranged according to the Universal Decimal Classification. Oxford, Pergamon Press, 1966. x, 354 p. (Commonwealth and International Library. Libraries and technical information division. Gen. ed. G. Chandler.)

BERLIN. Humboldt-Universität. *Institut für Bibliothekswissenschaft*
Verzeichnis bibliothekarischer Fachzeitschriften. Berlin, Deutsche Staatsbibliothek, 1966. 35 p.
List of journals on documentation arranged under country of origin.

BRITISH STANDARDS INSTITUTION. Documentation Standards Committee DOC/20 ISO IFLA conference on library statistics, 2nd-7th May 1966, English edition. [Report] London, the Institution, 1967. [2], 27 p.

BRITISH STANDARDS INSTITUTION
Specification for page sizes for books (untrimmed) and paperbacks (trimmed). London, the Institution, 1966. 6 p. (B.S. 1413.)

*BRITISH STANDARDS INSTITUTION.
Universal Decimal Classification. English full edition (4th International edition). Draft of the schedules of UDC 614. Public health. Accident prevention. London, the Institution, 1967. i, 163–201 p. (BSI Doc. no. 67/6438.)

*BRITISH STANDARDS INSTITUTION
Universal Decimal Classification. English full edition (4th International edition). Draft of the schedules of UDC 616.1/.9. Special pathology. London, the Institution, 1967. i, 400–545 p. (BSI Doc. no. 67/6313.)

BRYGOO, P. R.
Application de la machine flexowriter (Friden) a l'enregistrement des données dans les bibliothèques et centres de documentation: étude des programmes et des temps de production pour l'obtention des enregistrements destinés au traitement sur ordinateur. [Application of the flexowriter (Friden) to the recording of data in libraries and documentation centres: study of programmes and times of production for obtaining the proposed recordings by computer.] Paris, Institut Pasteur, 1966. vi, 258 p.
Rapport de la Convention de Recherche 62-FR-176 entre la Délégation Générale à la Recherche Scientifique et Technique (DGRST) et l' Institut Pasteur.

BRYGOO, P. R., *and* LEVERY, F.
Essai d'édition d'un prototype de bulletin signalétique produit par ordinateur IBM 1401 equipé d'une chaine d'impression à 120 caractères.
[Trial edition of a prototype for an indexing journal produced by IBM 1401 computer using 120 characters.] Paris, Institut Pasteur, 1966. 89 p.

Suppl. no. 1 to Brygoo, P. R. Application de la machine Flexowriter... Rapport final de la Convention de Recherche DGRST, Paris, 1966.

COMPUTER SCIENCES CORPORATION
Information retrieval and engineering aids system: final report. El Segundo, Calif., the Corporation, 1966. [15] p. $1.

COSTELLO, JOHN C.
Coordinate indexing. New Brunswick, New Jersey, Rutgers State University. Graduate School of Library Service, 1966. ix, 11–217, [6] p. tables, diagrs. (Rutgers Series on Systems for the Intellectual Organization of Information, *ed.* by Susan Artandi. vol. VII.)

CUADRA, CARLOS
Experimental studies of relevance judgements: third progress report. Santa Monica, System Development Corporation, 1967. 68 p. tables.

ENGLISH ELECTRIC. Central Library
Library bibliography: Selective Dissemination of Information (SDI). Whetstone, the Library, 1967. 3 p.

GREAT BRITAIN. Department of Education and Science *and others*
Computer education: report of an interdepartment working group. London, HMSO, 1967. 49 p.

*HARVARD UNIVERSITY. Library
Wicener Library shelflist no. 7: bibliography and bibliography periodicals. Cambridge, Mass., Harvard University Press; London, Oxford University Press, 1966. 1066 p. £16.

*HARVARD UNIVERSITY. Library
Wicener Library shelflist no. 8: reference collections, shelved in the Reading Room and Acquisitions Department. Cambridge, Mass., Harvard University Press; London, Oxford University Press, 1966. 187 p. 80*s.*

INDATA LTD *and* BRITISH SCIENTIFIC INSTRUMENT RESEARCH ASSOCIATION [SIRA]
Transcripts of speeches made at the presentation to government and industrial research organisations of the automation instrument data service. London, Indata, 1967. no paging.

LIBRARY HISTORY SEMINAR, 2nd, Tallahassee, Florida State University Library School, March 4–6, 1965.
Approaches to library history: proceedings.. *Ed.* by John David Marshall. Tallahassee, Journal of Library History, 1966. 183 p.

*LUDLIES, HILDEGARD, *ed.*
Verzeichnis der Bibliotheken in Berlin (West). Berlin, Heinz Spitzing, 1966. xii, 301 p.

MERSEL, JULES, *and others*
Information transfer in educational research: final report. Sherman Oaks, Calif., Informatics Inc., 1966. various paging.

MILITARY LIBRARIANS WORKSHOP. 9th. United States Military Academy, West Point, New York. 3–5 November 1965.
Conference proceedings. New York, the Academy, 1966. [95] p. $4.

PETRU, WILLIAM C., *and* WEST, MARTHA, W., *eds.*
The library: an introduction for library assistants. A project of the San Francisco Bay Region Chapter. New York, Special Libraries Association, 1967. viii, 79 p.

*PRETORIA. State Library
Directory of South African libraries. Part 1: scientific and research libraries. Pretoria, State Library, 1965. vi, 575 p.

PROBLEMS OF INFORMATION TRANSMISSION: a complete translation of the Russian journal *Problemy Peredachi Informatsii,* vol. II, no. 1, 1966. Washington, US Department of Commerce. Joint Publications Research Service, 1966. 151 p. diagrs. $5.

REES, ALAN M., *and* SCHULTZ, DOUGLAS G.
A field experimental approach to the study of relevance assessments in relation to document searching. Formal progress report, no. 3. Cleveland, Ohio, Western Reserve University, Center for Documentation and Communication Research, 1966. 11 p.

SCIENCE RESEARCH COUNCIL. Atlas Computer Laboratory
Some aspects of current operation and research. Didcot, Berks., the Laboratory, 1966. 67 p.

SHERROD, JOHN
Interdisciplinary symposium: society and information resources, the Federal viewpoint. Washington, DC, US Atomic Energy Commission, 1966. 7 p.
Remarks delivered at the Annual Meeting of the American Association for the Advancement of Science, Section T, 28 December 1966, Washington, DC.

*SPECIAL LIBRARIES ASSOCIATION. Washington DC Chapter
Directory and handbook. 5th ed. Washington, the Chapter, 1967. vi, 86 p. $5.

UNITED HOSPITAL FUND OF NEW YORK
Essentials for patients' libraries: a guide. New York, the Fund, 1966. 103 p. $2.50.

UNITED STATES DEPARTMENT OF COMMERCE. *Office of State Technical Services*
Technology transfer and innovation: a guide to the literature. Preliminary ed. Washington, the Office, 1966. ii, 49 p.

UNITED STATES DEPARTMENT OF THE INTERIOR. *Library*
Mechanized bibliography of documentation and information sciences. Rev. ed., compiled by H. Holzbauer. Washington, the Department, 1967. 157 p.

UNITED STATES LIBRARY OF CONGRESS. *Information Systems Office*
A preliminary report on the MARC (Machine-readable cataloging) pilot project. Washington, 1966. iv, 101 p.

UNITED STATES. NATIONAL BUREAU OF STANDARDS
Status report: national standard reference data system, edited by Edward L. Brady. Washington, the Bureau, 1966. iv, 79 p. 50c.

WILLIAMS, BERNARD J. S.
Microforms in the United States: a tour of equipment manufacturers and users, November 1966. Hatfield, Herts. [College of Technology], 1967. 48 p. diagrs.

WILSON, LOUIS ROUND
Education and libraries: selected papers. Edited with a biographical sketch and commentary by Maurice F. Tauber and Jerold Orne. London, Crosby Lockwood, 1966. xviii, 344 p.

WILSON, PATRICK
Power and knowledge: an essay on bibliographical control. Berkeley, Calif., University School of Librarianship, 1967. 185 p.

*YEARBOOK of international organizations . . . 1966–7. 11th ed. Brussels, Union of International Associations, [1967]. 1007 p. (Publication no. 205.) £6 9s 6d.

Articles and Papers

ARIES, PHILIPPE
Un lexique par phrases descriptives. *Bulletin de l'A.I.D.*, vol.5, no.4, 1966, p.99–101.

ATANASIU, PIA
Informarea curenta rapida. I: Publicatii si servicii pe plan mondial. [Rapid current information. I. World scale publications and services.] *Studii si Cercetari de Documentare si Bibliologie*, vol.8, no.4, December 1966, p.457–69.

BELLPORT, B. P.
Bureau of Reclamation thesaurus of descriptors. *Bulletin de l'A.I.D.*, vol.5, no.4, 1966, p.55–7.

BOLLES, SHIRLEY W.
The use of flow charts in the analysis of library operations. *Special Libraries*, vol.58, no.2, February 1967, p.95–8.

BRENNER, EVERETT H., *and* MULVIHILL, J. G.
American Petroleum Institute information retrieval project subject authority list. *Bulletin de l'A.I.D.*, vol.5, no.4, 1966, p.81–4.

COMMUNICATION in the biological sciences: [papers given at a conference and exhibition held at the Natural History Museum, 14th and 15th December 1966]. *Institute of Biology Journal*, vol.14, no.1, February 1967, p.2–23.

COOK, JAMES
The science information problem Copied from *Advancement of Science*, October 1966, p.305–9.

COVILL, GEORGE W.
Librarian + systems analyst = teamwork? *Special Libraries*, vol.58, no.2, February 1967, p.99–101.

DAHLBERG, INGETRAUT
Thesaurus research: Deutsche Gesellschaft für Dokumentation E.V. *Bulletin de l'A.I.D.*, vol.5, no.4, 1966, p.103–4.

DETANT, MARCEL
Les problèmes terminologiques dans la documentation nucléaire de l'Euratom. *Bulletin de l'A.I.D.*, vol.5, no.4, 1966, p.67–77.

DIJK, MARCEL VAN
Un thésaurus multilingue au service de la coopération internationale. [A multilingual thesaurus towards the work of international cooperation.] *Bulletin de l'A.I.D.*, vol.5, no.4, 1966, p.85–7.

DYSON, G. M.
Computer input and the semantic organization of scientific terms—1. *Information Storage and Retrieval*, vol.3, no.2, April 1967, p.35–115.

ERIKSSON, ANN M., *and* JOHNSTON, DAVID A.
Ohio's computer code retrieval system. *Information Retrieval Letter*, vol.2, no.9, January 1967, p.1–3.

EWALD, GUSTAV
Mikroorganismen als Schädlinge in Bibliotheken und Archiven [Harmful microorganisms in libraries and archives.] Wiesbaden, Otto Harrassowitz, 1966. Sonderdruck aus *Bibliothek und Wissenschaft*. Band 3, 1966, p.13–112.

FAIRHURST, HARRY
J. B. Morrell Library, York [University Library]. *Library World*, vol.58, no.801, March 1967, p.244–9.

GARSIDE, KENNETH
Erfahrungen mit der anwendung bekannter Klassifikationssysteme in Englischen Bibliotheken. [Classification schemes used in English libraries.] *Zeitschriften für Bibliothekswesen und Bibliographie*, vol.14, no.1, 1967, p.1–7.

GARVEY, WILLIAM D., *and* GRIFFITH, BELVER C.
Studies of social innovations in scientific communication in psychology. Reprint from *American Psychologist*, vol.21, no.11, November 1966, p.1019–36.

GOOD, I. J.
The decision-theory approach to the evaluation of information-retrieval systems. *Information Storage and Retrieval*, vol.3, no.2, April 1967, p.31–4.

CHURCHHOUSE, R. F.
The Atlas Laboratory information retrieval project. Extracted from *Science Research Council. Atlas Computer Laboratory.* Some aspects of current operation . . . 1966. p.43–8.

HALKIN, JACQUES E. J.
Les vocabulaires documentaires: formation, utilisation et crise de croissance. [Documentation languages: formation, use and problems of development.] *Bulletin de l'A.I.D.,* vol.5, no.4, 1966, p.19–28.

HOLST, W.
Problems connected with the use of a polytechnical thesaurus. *Bulletin de l'A.I.D.,* vol.5, no.4, 1966, p.105–9.

HYSLOP, MARJORIE R.
Joint development of a common information system by two organizations working in different disciplines. *Bulletin de l'A.I.D.,* vol.5, no.4, 1966, p.89–97.

[INFORMATION dissemination and retrieval symposium held at Attingham Park, Shrewsbury, 13–15 June 1966: reports of papers presented.] *RAPRA Bulletin,* vol.20, no.5, September–October 1966, p.65–72.

KOSTER, KURT
The use of computers in compiling national bibliographies, illustrated by the example of the Deutsche Bibliographie. *Libri,* vol.16, no.4, 1966, p.269–81.

LAMKIN, BURTON E.
Systems analysis in top management communication. *Special Libraries,* vol.58, no.2, February 1967, p.90–4.

KRUMHOLZ, W.
Uber die Notwendigkeit der Dokumentation sozialer Daten. [On the necessity of a documentation of social data.] *Nachrichten für Dokumentation,* vol.18, no.1, February 1967, p.13–15.

LANGWELL, W. H.
Accelerated ageing tests for paper. *Journal of the Society of Archivists,* vol.3, no.5, April 1967, p.245–8.

LAZARESCU, GEORGETA
Sisteme de informare moderne aplicate de plan mondial: studiu comparativ. [Modern information systems applied on a world scale: a comparative study.] *Studii si Cercetari de Documentare si Bibliologie,* vol.8, no.4, December 1966, p.423–37.

LECHMANN, H.
Leitsätze für eine nationale Dokumentations- und Informationspolitik im Bereich der Wissenschaft und Technik. [Guiding principles for a national documentation and information policy in science and technology.] *Nachrichten für Dokumentation,* vol.18, no.1, February 1967, p.16–19.

LINGENBERG, WALTER
Uber das Arbeiten mit Lochstreifen bei speziellen Bibliotheksproblemen. [Work with punched tape in a special library.] *Zeitschriften für Bibliothekswesen und Bibliographie,* vol.14, no.1, 1967, p.8–14.

LLOYD, L. J.
Exeter [University Library]. *Library World,* vol.58, no.801, March 1967, p.249–51.

MELLANBY, KENNETH
A damp squib. *New Scientist,* vol.33, no.537, 23rd March 1967, p.626–7.
Suggests that modern scientific research is being stifled and may die out. Publications not keeping pace with number of personnel.

MILLER, JAMES G.
A health sciences information center—and how a university might design its own. *Educom,* vol.1, no.6, September 1966, p.1–4, 9.

MONREAL, WALT
Random access: what it means, what it does, how it works. *International Business Equipment,* vol.4, no.3, March 1967, p.12–14.

MOORE, EDYTHE
Systems analysis; an overview. *Special Libraries,* vol.58, no.2, February 1967, p.87–90.

NETWORKS for instant information. *Educom,* vol.1, no.7, October 1966, p.3–8.

NICOLAUS, JOHN J.
Description of the Bureau of Ships thesaurus of descriptive terms and code book. *Bulletin de l'A.I.D.,* vol.5, no.4, 1966, p.59–65.

NOBBS, P. M.
Pulp and Paper Research Institute of Canada. *Bulletin de l'A.I.D.,* vol.5, no.4, 1966, p.79–80.

NOVIKOVA, E. E.
Present trends in cataloguing in the U.S.S.R. *Unesco Bulletin for Libraries,* vol.21, no.1, January–February 1967, p.22–9.

[ON thesauri: special issue.] *Bulletin de l'Association Internationale des Documentalistes,* vol.5, no.4, 1966. Includes index to thesauri mentioned.

OVERHAGE, CARL F. J.
Science libraries: prospects and problems. *Science,* vol.155, no.3764, February 17, 1967, p.802–6.

PECK, DANIEL
Labels and labelling systems. Copied from *Administrative Management,* vol.27, no.8, August 1966, p.54–60.

PEREZ-VITORIA, A.
Scientific and technical documentation in Africa. *Unesco Chronicle,* vol. 13, no.2, February 1967, p.61–3.

PICKFORD, A. G. A.
FAIR (Fast Access Information Retrieval) project; aims and methods. *Aslib Proceedings,* vol.19, no.3, March 1967, p.79–95.

POLZOVICZ, IVAN
Tendinte noi ale informarii sistematice in documentarea stiintifica. [New trends of systematic information in scientific documentation.] *Studii si Cercetari de Documentare si Bibliologie,* vol.8, no.4, December 1966, p.439–56.

REACHING the reader. IV. The university library. *Times Literary Supplement,* no.3393, 9th March 1967, p.189–90.

RIECK, J.
Thesauri über die Entwicklungsländer-Dokumentation. [Documentation thesauri in newly developing countries.] *Nachrichten für Dokumentation,* vol.18, no.1, February 1967, p.32–4.

SIEGMANN, PHILIP J., *and* GRIFFITH, BELVER C.
The changing role of Psychological Abstracts in scientific communication. Reprint from *American Psychologist,* vol.21, no.11, November 1966, p.1037–43.

SPEIGHT, FRANK Y.
What is "the Thesaurus of engineering terms" developed by the Engineers Joint Council (EJC). *Bulletin de l'A.I.D.,* vol.5, no.4, 1966, p.29–43.

STEVENSON, C. G.
Checklist for review and evaluation of technical libraries. *Special Libraries,* vol.58, no.2, February 1967, p.106–10.

STEWART, S. O.
Keele [University Library]. *Library World,* vol.58, no.801, March 1967, p.251–3.

SUBJECT bibliographies and reference books. *Dokumentation, Fachbibliothek, Werksbücherei,* vol.15, no.3, February–March 1967, p.67–106. Short article followed by broadly classified list of bibliographical reference books.

TEICHMANN, H.
Kybernetik und Dokumentation. [Cybernetics and documentation.] *Nachrichten für Dokumentation,* vol.18, no.1, February 1967, p.1–5.

TUCKER, P. E.
Warwick [University Library]. *Library World,* vol.58, no.801, March 1967, p.239–43.

WASON, P. C.
The effect of compressing information on its retention. London, Presentation of Technical Information Group, [1967].

WERNER, HEINZ
Die Jahresversammlung der internationalen Vereinigung der Musikbibliotheken vom 4.9–8.9. 1966 in Warschau. [The annual meeting of the International Association of Music Libraries from September 4 to 8, 1966, in Warsaw.] *Zentralblatt für Bibliothekswesen,* vol.81, no.2, 1967, p.94–6.

WHALEY, FRED R., *and* FLANAGAN, CAROLYN M.
The Engineering Index thesaurus. *Bulletin de l'A.I.D.,* vol.5, no.4, 1966, p.45–52.

WHEELER, FRED
Keeping up with electronics. *New Scientist,* vol.33, no.535, March 9, 1967, p.452. New co-operation between Indata and SIRA to set up data bank of information on electronic instruments—a link between manufacturers and users.

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TRANSLATIONS from French, Italian, Spanish, Russian, German into English and from the above into French, Russian, Italian. Subjects: technical and medical. S. Akerib, 5 Forge Close, Hayes, Bromley, Kent.

AUTHORITATIVE TECHNICAL TRANSLATIONS from French, German and Dutch into English and from English, French and German into Dutch, specialities electronics, optics, instruments, photography. API Ltd, director K. S. Ankersmit, FIL (French, German, English), 19 Godstone Road, Purley, Surrey. BYWood 3781.

TECHNICAL SWEDISH, DANISH, NORWEGIAN translated by J. T. Cradlock, B COM, FIL, Ekard, Ray Park Avenue, Maidenhead, Berks. Maidenhead 24931.

WILFRED E. GOODAY, ARSM, DIC, MIMM, FIL. Member of Translators' Guild. Romanian and French. 161 Rivermead Court, London SW6. Renown 1912.

TECHNICAL TRANSLATIONS from Russian, German and Polish into English. B. Klipstein, B SC(HONS), 1 Glenview Grove, Shipley, Yorkshire. Tel. Shipley 58215.

TECHNICAL AND COMMERCIAL translations from English into Russian. Mrs O. Linsley, 31 Parke Road, Barnes, London SW13. Tel. 01-748 8822.

TRANSLATIONS FROM TURKISH. All subjects. F. P. Scott, 4 Uphill Grove, Mill Hill, London NW7.

TRANSLATIONS: TECHNICAL, SCIENTIFIC, all west-European languages. J. Smuts, B SC (ENGINEERING), FIL, 12 Thorndene Avenue, London N11. LABurnum 7723.

TECHNICAL OR COMMERCIAL translations into/from English, German, Dutch and French. A. M. H. Speller, FIL, NGV, 6 Lakeside, West Ealing, London W13. Tel. 01-998 1045.

TECHNICAL TRANSLATIONS. Spanish, French, German. Typescript, camera copy, direct image plates. E. W. Sykes, FIL, 39 West Close, Wembley Park, Middlesex. ARNold 4273.

GERMAN/ENGLISH Translations. Commercial or technical, speciality ceramics, immediate service. Margret Young, FIL, 9 Osborne Road, Enfield. HOWard 4366.

Appointments vacant

ARCHITECTURAL ASSOCIATION. The Architectural Association, with the support of the office for Scientific and Technical Information, proposes to set up a pilot study of the information needs of architects. A research worker is needed as soon as possible. The initial period is six months, with the likelihood of extension for a further eighteen months. Applications from information scientists/librarians with experience in the building industry or architects with information research background. Details from and applications to: The Director of Programme, Architectural Association, 36 Bedford Square, WC1.

INFORMATION ASSISTANT required for literature searching, abstracting and other work in a small library. Applicants should be under 30 years of age and have a degree in chemistry or a good knowledge of the subject. Experience in information work is not essential. Please apply in writing to The Research Manager, Central Research Laboratories, Associated Lead Manufacturers Ltd, 7 Wadsworth Road, Perivale, Greenford, Middlesex.

ASSISTANT KEEPER, INDIA OFFICE LIBRARY, COMMONWEALTH OFFICE. Post for man or woman aged at least 28 as Assistant Keeper, First Class, in the India Office Library in London. DUTIES: Responsibility for the printed books in European languages and some general administration. QUALIFICATIONS: First or second class honours degree, good reading knowledge of French and German, and library qualifications or experience essential. SALARY (Inner London): £1,770–£2,900. Starting salary may be above minimum. Non-contributory pension. Write to Civil Service Commission, Savile Row, London W1, for application form, quoting 6681/67. Closing date 1st June 1967.

INTERESTING WORK offered in a small technical library. Typing essential, library experience advantage. Please apply in writing giving details of education, experience, salary required, references. The Secretary, The Institute of Welding, 54 Princes Gate, Exhibition Road, London SW7.

LIBRARIAN for the National Coal Board's Central Engineering Establishment at Stanhope Bretby, near Burton-on-Trent. In addition to maintaining the general Library services necessary in an Engineering Establishment, the successful candidate will be required to provide first class coverage of mining techniques throughout the world and to exploit this to the full by means of abstracts, etc. Candidates must be at least Associates of the Library Association and for preference should have had experience in a technical library.

The appointment is superannuable, and salary according to qualifications and experience, will be within the range £1,275–£1,665. Please write with full details to the Headquarters Staff Manager, (X.4018), National Coal Board, Hobart House, Grosvenor Place, London SW1.

NEWCASTLE UPON TYNE EDUCATION COMMITTEE, Municipal College of Commerce (Proposed Polytechnic). Applications are invited from Fellows of the Library Association for the following new appointments in connection with the development of degree courses: PRINCIPAL LECTURER, main subject Bibliography. SENIOR LECTURER, main subject Information Science. Application forms and full details obtainable from the Principal, College of Commerce, College Street, Newcastle upon Tyne 1. Salary scale: Principal Lecturer: £2,380 to £2,600. Senior Lecturer: £2,140 to £2,380. Applications to be submitted within fourteen days.

ROYAL NAVAL SCIENTIFIC SERVICE, NAVAL SCIENTIFIC AND TECHNICAL INFORMATION CENTRE, St Mary Cray, Kent. EXPERIMENTAL OFFICER/ ASSISTANT EXPERIMENTAL OFFICER required for the Reports Section, which disseminates scientific and technical information (mainly unpublished reports on Naval R & D) to Navy Department and other interested organizations. Wide ranging interest in scientific and technical fields, and ability to write clear English essential. Work includes abstracting and indexing of reports; deciding dissemination to Navy Dept Laboratories; use of new punched-card retrieval system.

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APPLICATIONS to Superintendent Scientific Personnel (Naval), Ministry of Defence (Navy Department), Old Admiralty Building, London SW1.

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Salary will be commensurate with experience and qualifications. Applications, giving details of qualifications, experience, age and present salary, should be sent within fourteen days to: The Secretary (LIO), The Royal Society for the Prevention of Accidents (RoSPA), 52 Grosvenor Gardens, London SW1.

Gloucestershire Education Committee

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Candidates should be men or women aged between 25 and 35 years who have a knowledge of librarianship and an enthusiasm for this kind of work. Technical knowledge, whilst useful, is by no means essential and the appointment could well appeal to a young graduate interested in information work or to a librarian who wishes to move into the liveliness and challenge of the chemical industry.

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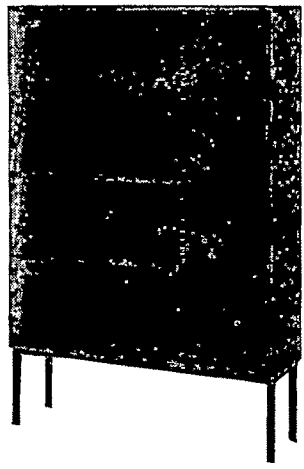

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Aslib Proc. vol.19 no.6 pp.157-209 London, June 1967

ASLIB PROCEEDINGS

incorporating Aslib Information

Volume 19 June 1967 **Number 6**

ASLIB CALENDAR 1967

June

THU.22. Evening meeting at Aslib. Patent Information Services.

MON.26 – THU.6. Senior Introductory Course to Special Library and Information Work.

July

THU.27. Afternoon meeting. Port of London.

October

MON.9. – THU.12. 41st Annual Conference at Harrogate.

Chemical Group

Annual General Meeting

After lunch Dr G. A. Somerfield of OSTI delivered a paper entitled 'The next 100 weeks in chemical information', a shortened version of which we hope to publish in *Aslib Proceedings*.

Liaison Officer

The Group Committee has announced that Mr P. F. Cole (BP Research Centre, Chertsey Road, Sunbury-on-Thames, Middlesex) has agreed to join the Committee. Mr Cole, with the assistance of Mr J. Rippon, will collect suggestions from the membership for possible research topics and will act in a liaison capacity between the Research Department and the Group Committee. Mr Cole will report to the Membership from time-to-time through Newsletter.

Attingham Park Conference

A successful Conference was held at Attingham Park on 15th to 17th May. We hope to publish the conclusions of the various working parties, together with summaries of the papers by Mr David (Development Director, Shell Research Ltd, Woodstock Agricultural Centre), Dr Fryers (Managing Director, Bayer Products Ltd) and Dr Yarsley (Managing Director, Yarsley Research Laboratories) in a future issue of *Aslib Proceedings*.

Mr C. W. Hanson

Mr C. W. Hanson retired officially from full-time employment on the staff of Aslib at the end of May on reaching the age of 65, and members will want to wish him a happy retirement—which already looks like being only a little less fully occupied than his working life has been. Though a member of the staff only since the beginning of 1959 when he was appointed Head of the Research Department, Hanson has been closely associated with Aslib for over twenty years, and has in fact contributed to its work in almost every conceivable capacity—on the Council, on most of the standing committees, as an author, a lecturer at courses and a speaker at conferences.

A mechanical engineer by training, he came to Aslib with a wealth of experience connected with various aspects of paper and print, as a technical editor, a free-lance technical journalist and a press liaison officer in industry. Subsequently, from 1941–45, he was Information Officer of the Magnesium Metal Corporation in Swansea and, for the next fourteen years, Head of the Information Department of the British Scientific Instrument Research Association. It was here that he began to be convinced that information work could claim to be a discipline in its own right, with a body of knowledge that could be taught and added to by study and research—a far from universally held conviction even now.

This conviction, allied to his peculiarly appropriate experience, made him a natural choice to lead Aslib's first planned incursion into the hitherto unassayed

field of research. The wisdom of the choice and the value of his work as head of the Research Department for the crucial first seven years are borne out not only by the soundness of the training in research methods which his assistants have received at his hands, but also by the fact that both Government and industry have recognized the sureness of the foundations which he has laid by offering between them up to £50,000 a year for the support of Aslib's research activities. In these, Chris Hanson still has a very great deal to offer and it is hoped to take full advantage of his monumental capacity for work during his years of retirement.

Facts for the Board Room

The April 1967 issue of *The Director,* the journal of the Institute of Directors, carries on p. 32–4 an interesting commentary on a talk given by Mr Leslie Wilson, Director of Aslib, last November to the Parliamentary and Scientific Committee. Members may find this a useful reference to bring to the notice of their managements. For those who may be interested in the more detailed content of Mr Wilson's paper, photo copies can be made available on application to him.

Ph.D. in Information Science

The City University, London, is now prepared to consider applications from students interested in undertaking research in information science problems leading to the degree of Ph.D. Students should have an honours degree in a science, engineering, or social science. The period of research must be not less than two years (preferably three), and may suitably follow the one-year course in information science leading to the degree of M.Sc. Further information can be obtained from Mr J. Farradane, Senior Research Fellow at the City University, St John Street, London EC1.

IFIP Congress 68

The 1968 meeting of the International Federation for Information Processing will be held in Edinburgh from 5th to 10th August. Some 250 papers will be delivered covering computer equipment, computer programming languages, scientific applications, commercial data processing, mathematics, and education. First drafts of papers should be submitted by 30th November 1967.

In addition to the Congress, an exhibition of computing and allied equipment will be held at the Waverley Market, Edinburgh. It is also hoped to perform during the Congress the three prizewinning entries in a competition for computer-composed music.

Further details may be obtained from the IFIP Congress Office, 23 Dorset Square, London NW1.

Automation of Library Catalogues

The Office for Scientific and Technical Information (OSTI) has awarded over £30,000 to the Universities of Newcastle upon Tyne and Cambridge for research into the use of computers for library cataloguing.

The Newcastle grant (£12,500 over two years) supports a project for the conversion of the entire catalogue of the University Library. It is also for experimental work to discover how far the catalogue can be improved, either by use of the computer programs or by hand-editing of special print-outs designed to highlight particular types of error. Later it is intended to carry out an exploration of the types and forms of catalogue that best suit the requirements of readers. Previous studies of catalogue use have been limited, because it has not been possible to test different types of catalogue in the same library.

A grant of £17,870 over three years has been made to the Scientific Periodical Library, formerly the Philosophical Library, of the University of Cambridge, to support an investigation into the production of a union catalogue of the scientific books in the University's departmental libraries. The entire catalogues of a sample of these libraries will be converted to machine-readable form. A thorough investigation will then be made into the problems of merging the separate catalogues by computer and producing a union catalogue of the combined holdings. Problems of producing separate catalogues for the individual libraries will also be investigated.

Cumulated UDC Supplement (-1964)

Since 1950, approved additions and amendments to the full tables of the Universal Decimal Classification have been regularly published in *Extensions and Connections to the UDC,* a series which cumulates over three-year periods. The cumulations so far published are: 1 : 6 (1949–52), 2 : 6 (1953–5), 3 : 6 (1955–8) all at *f*30 a volume; 4 : 6 (1959–61) at *f*40; and 5 : 6 (1962–4) at *f*50.

Users who wish to update their editions, but do not want to go to the expense of buying details of all classes, may be interested in the FID's proposal to publish the material in the above series, together with the 1951 *Ergänzungen,* in six volumes covering the classes 0/3; 5/61; 62/621; 622/65; 66/68 and 69/9 (with auxiliaries) at *f*30 a volume.

Since this project represents a considerable investment, the FID Secretariat needs to know what support it would receive before going ahead. They therefore invite all those who would be prepared to buy one or more of the proposed volumes to place an advance order now. The Federation's address is 7 Hofweg, The Hague, Netherlands.

Technical Book Review

In an age when new journals spring up like mushrooms it is sad to see the demise of one so useful as the *Technical Book Review,* the last issue of which appeared in May.

This last issue is, as it happens, of particular value in that it contains two substantial review articles, one by Professor H. L. Price and Dr F. R. Drake, a nine-page survey of current books on mathematics for engineers, and the other by G. G. Hall and D. Rees, which surveys and compares seventeen degree-level textbooks on quantum mechanics, giving a good deal of quantitative data on the approach, subject matter, and presentation of the works discussed.

This whole issue in fact is devoted to reviews, many of such value as to give cause for regret that the *Technical Book Review* is no more.

Readers who wish to obtain copies of the review articles mentioned should write to: TBR Publications, 71 Fleet Street, London EC4.

Review

KUNITZ, S. J., *and* COLBY, V., *eds.* European authors 1000–1900. H. W. Wilson, 1967. 1016 p. $18.

This, the latest reference book published by the H. W. Wilson Company, contains biographies of 967 major authors living during the years 1000–1900 and many of the entries are illustrated with a portrait of the subject. The titles and dates of the authors' works are given in the main text, but it is unfortunate that a few of the biographers mention only the English and not the original language title of the books. Two useful bibliographies appear at the end of each entry; one lists title, author and date, but not publisher, of English translations of the author's works and the other lists publications about the author. It should be noted that the book refers to authors from continental Europe only, and therefore British authors are not included.

The publishers say that this book is written with the general reader in mind rather than the research student, and it appears to fulfil this purpose adequately.

Co-operative Acquisition of Foreign Books

The Library Association has recently set up a small sub-committee to consider the question of co-operative acquisition of foreign books and other material, possibly, among other things, with a view to encouraging the growth of further subject-based co-operative schemes like SCOLMA (Standing Conference on Library Materials on Africa).

As a first step the sub-committee is trying to gather as much information as possible about existing schemes which involve co-operative acquisition of foreign material. These include general schemes for co-operative acquisition which make substantial provision for foreign material. Information is sought on both formal and informal schemes, and on the ways in which they work. Librarians who are in a position to supply up-to-date information are invited to communicate as soon as possible with the Research Officer, the Library Association, 7 Ridgmount Street, London WC1.

Dr D. G. Brown

Members of Aslib, especially those in Scotland, will learn with regret of the death of Dr D. G. Brown, until 1958 librarian of the Nobel Division of Imperial Chemical Industries Ltd. Dr Brown was a well known figure at Aslib conferences and an active worker in Scottish Branch affairs—he was the Branch Chairman until 1954. He served as an elected member of the Council of Aslib from 1951–54 and thereafter as the Scottish Branch official representative until 1960. He also served at various times as a member of the Executive and Finance Committee and of the Conference and Meetings and Education Committees; and he represented Aslib on the Scottish Central for Students.

Aslib was represented by Mr W. H. Rutherford, Honorary Secretary of the Scottish Branch, at the service before cremation on 24th May.

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Trefileries Leon Bekaert	Belgium	J. Mekeirle
Water-Tube Boilermakers' Association	London	D. W. Bloomfield

INDIVIDUAL

Name	*Locality*
Adams, Mrs W. M. L.	London
Arun, K. C.	Malaysia
Ayerst, Mrs S. G.	Staffordshire
Bugden, Miss A. R.	Kent
Cheesman, B.	Cheshire
Cloke, Miss J. E.	London
Duchesne, R. M.	Birmingham
Filipe-Campos, Mrs F.	London
Gupta, V. K.	London
Hockley, Mrs B. G.	Cardiff
Lovell, Mrs M.	London
Miller, Mrs S. E.	Leicester
Mullis, A. A.	London
Piternick, G.	Canada
Routh, S. J.	Australia
Smeeton, J.	Buckinghamshire
Tapson, Lieut. F.	B.F.P.O. 51
Taylor, R. H.	Wiltshire
Whessell, Miss J. M.	Leicestershire
Wyness, Miss P.	London

THE FUTURE OF INFORMATION WORK
THE ASLIB ANNUAL LECTURE

delivered by

DR W.E.BATTEN

Central Technical Information Unit, ICI

The Royal Institution, Wednesday 5th April 1967

AN annual lecture is, by any standards, a daunting occasion. But when it is a *first* annual lecture; and when it is for Aslib; and when it is delivered from a spot that is almost hallowed by the integrity and distinction of successive incumbents, then humility must moderate whatever gospel the speaker personally embraces. In this spirit, I will do my best to inaugurate an annual occasion that will, I hope, grow in esteem, hand in hand with the emerging stature and dignity of our art.

It has been said that 'the Librarian serves God', and 'the Information Officer serves the Devil'. This apocryphal distinction of motivation obscures their community of interest in methodology. What I have to say this evening will, I hope, be equally palatable or at least unpalatable to both components of the greater system.

When one compares today with yesterday, two forces emerge as the dominating factors for the future—growth of literature and growth of computer technology. The missile, and the anti-missile. There is, however, an essential component missing from this over-simplified model and it is the isolation and refinement of that component that will dominate the thinking hours of our profession for possibly the next two decades. Whether in research or in operations, we shall be pursuing this conceptual will-o'-the-wisp. It is time that it had a name.

To the now familiar 'hardware' and 'software' it is desirable that we formally co-opt a third type of ware—which I beg leave this afternoon formally to christen 'the underwear'—because it must inspire confidence without contributing to the display! We have to fashion these foundation garments to suit a variety of visible presentations. They must, of course, provide discipline without constraint. They must lie equally happily with Savile Row and with Carnaby Street.

The current formidable growth of literature has too often been called an explosion. The so-called exponential growth factor has been operative ever since Caxton invented his devilish contraption, and even before that man had invented special written languages that could be more speedily chipped on

stone. But algebra cannot always ignore arithmetic. Ten times very little was still very little, whereas ten times a lot is a hell of a lot!—and we notice it! At this stage in the expansion many fragments élude useful capture, and become mere fall-out. In this sense there is explosion, and in this sense we have somehow to contain it.

But our explosion is potentially benevolent. Each hot fast particle carries benefit for someone somewhere, if only he can be found. To the wrong person, however, it is the hot breath of a dragon—unwelcome and distracting—something from which he desires to be protected. The early phases of this documentary chain reaction were initiated in an atmosphere that was serene and scholarly. The library geiger-counters were silent! Sheep could safely graze—for both inspiration and information: and we should note in passing that these are two different needs. Indeed it may be a part of our problem to find out whether our well-meaning attempts to provide information services dare extend into the area of what I will call inspirational reading. I am inclined to think that it is none of our business—although I would be the first to admit that a sympathetic and well-read librarian can be a great help to the mind that is able to indicate its need. Nevertheless, unless psychiatry and brain-washing are to form a part of our service, the broadening and mellowing of minds is probably better left to cultural wanderlust. But for purely informational reading, self-service with indexes, catalogues, title-lists, etc., is fast becoming frustrating, if not impossible. We now require the assistance of some selective retailing process that can treat us, if not as individuals, at least as members of small groups. This need has not escaped the notice of publishers, and we may, with confidence, expect much help from that quarter in the years to come. The trend is visible, I think: greater specialization by 'original' journals: more review articles: first-class general coverage of the broad avenues of progress: abstracts in fields where they previously did not exist—and accompanied by sophisticated, if expensive, retrieval devices. The services of *Chemical Abstracts* and of MEDLARS are already well-known examples of the latter development. But however well conceived and adjusted the subdivision and regrouping of journals may become, it cannot satisfy with precision the informational appetites of individuals or teams working in the dark vastness of inter-disciplinary space.

Arithmetically, the growth of users no doubt roughly matches the growth of literature itself (there can be no egg without a chicken) and so the 'relevant words per reader' figure should not increase. But there is no comfort in this purely statistical equilibrium, for it masks the true source of our embarrassment, namely the ever-increasing 'choosiness' of the proliferating reader and the ever-increasing specificity of the proliferating literature. The effect is autocatalytic: there seems to be no naturally occurring negative feedback.

Into this mushroom cloud of turbulent entropy storm the brave electronic shock troops—the Princes and Prelates from Poughkeepsie and from Putney; wresting order out of chaos in scintillating flashes of binary perception. They bring us ever-greater core-stores and ever-increasing transfer speed; increasingly versatile input and output equipment—both permanent and momentary. They can print faster than a man can read! To all of which they add devices whereby the human can conduct an albeit stilted dialogue with the machine, up to the

limit of what they have respectively been taught. All these miracles the computer performs by an instantaneous if moronic ability to distinguish between 0 and 1—nothing more. Vices and failings it may have in plenty, but assuredly original sin is not one of them! It is the supreme worker to rule: the ideal for sergeant-major or shop steward. But let us not be derogatory of this preoccupation with 1's and 0's. They are the very elements of which information is composed. Given enough of them one can express minutely discriminate information—as every client of Mr Littlewood can discover for himself any Saturday evening.

So, here is a powerful tool: and all around us is good and plentiful material. Who's skill and what skill shall guide the tool?

The problem is not basically new. What *is* new is its scale. The load, the power, the speed and the unthinking discipline of the new robot create a gear ratio where a false move, or a good move, will have vastly more effect than hitherto. Only the human contribution can decide whether we shall have a Sorcerer's Apprentice or a Fairy Godmother.

Two ways—two underwears—have always been available to the information worker, viz: (1) to arm the reference to match the expected questions, or (2) to arm the question to match the existing references. Expediency has so far favoured the first approach. Does it now favour the second—or are we bemused by the prospect of miracles? Or is not the optimum solution where it always was—somewhere between these two extremes? The intelligent human intermediary did much of both (1) and (2) as he searched. Now, what he used to do silently and spontaneously has to be articulated in advance—so that it may be taught to a machine—unless it be discovered that there is some way of comparing ideas without the irksome chore of recognizing their meaning.

If we represent the reference—the article—the item—the report—solely in terms that are so chosen as to make it maximally responsive to inquiries, we will inevitably weaken the very specificity that is the implicit statement of its immediate intellectual destination. If, however, we represent the reference solely within the limits of its own specificity, then we shall withhold it from many who, in fact, would benefit from it—unless we take quite other and additional steps to moderate the situation. Those 'other and additional steps' will prove to be intellectually very similar to the steps involved in the first of the alternative approaches. We are concerned, I believe, with a delta of bridges across a single river, *not* with a single bridge across a delta of rivers.

How we should proportion our efforts as between (1) widening the radiation from the reference and (2) widening the absorptive capacity of the question must depend at any given time and place upon the rational interplay between knowledge and the cost of its application. We are concerned to reduce the number of unknowns in this equation.

As to applicable knowledge, there seems little at present to choose between the two approaches save that there is more experience of the former. Both author and inquirer express themselves in words, whereas their effective communion is by concepts, and their mutual understanding is by ideas. Generalization from either side of the interface does some violence to the explicit statement, a violence that can be minimized only by exercising the most careful

semantic discipline and by explicitly recording its genesis, its current forms, and its evolution. All this is intellectual work, not manipulable by 1's and 0's save at the later stages of physical compilation and repetitive operation. Furthermore, it is intellectual work attuned to a particular conceptual environment. It has not yet endowed the world with universal principles.

As to cost, there might appear to be this much to be said for developing the question rather than the reference. It is a task to be done only as often as there are questions—not as often as there are references. Most people's experience is that there are far more references than questions and this is one factor supporting the 'free-text searching' school. But this disparity between numbers of inquiries and numbers of references is at odds with the proposition that readers multiply at least as fast as authors. Does it, perhaps, reflect despair in the questioner rather than a sublime state of current awareness? Does it, perhaps, reflect our present inability to provide 'tailor-made' collections?

There is also a very human factor bearing upon the choice of approach. Few qualified people enjoy indexing. In any event, the judgment of the market place gives them every incentive to do something else. On the other hand, the semantic development of questions (which is not *called* indexing although it *is*) is acquiring an aura of dignity and, possibly, even a favourable glance in the market place. Human factors cannot be ignored, and cannot always be countered by mere revaluation of effort. The balance of probability for the future seems to be in favour of a reduction in indexing effort at input, and an increase in interpretive effort when formulating the question for operative treatment.

This shift of emphasis would not, however, by itself create the 'delta of bridges' of which I spoke earlier. Indeed, it could be said that developing the question rather than the reference is still like trying to build both sides of a bridge from one side of the river. For if one is to develop the question so as to make it responsive to the inherent specificity of the references one must go up one semantic hierachy and back down others in order to provide complementary verbal elements that are expressible and comparable as 1's and 0's. Much of this game of linguistic snakes and ladders could admittedly be mechanized, but the board has to be marked out, the rules have to be specified, the dice have to be loaded and the whole system has to be perpetually up-dated, and to me it appears to be at least as challenging intellectually as thesaurus making—and no more and no less universal in its applicability.

Here we must in decency pause to consider the user, for he too operates in an evolving environment. Perhaps when he asks about 'rats' he really means 'rats only' and not 'rodents'. Neither he nor we are thought-readers. The art of explicit inquiry is an area for active and urgent study. It is an area where we might learn from the lawyers and from the psychologists. Inquiries should not be widened or slanted simply to mask shame of ignorance (there should be *no* shame of specific factual ignorance, for what is knowledge, when gained, but the ability to be ignorant on a broader front?). Nor should inquiries be narrowed to avoid pertinent, if tiresome, reading. Specialization is becoming a necessary feature in the mad race for human 'betterment'; but real winners have rarely been bred by 'blind-eye' out of 'wind of change'. Given, however, goodwill and good understanding, the time is fast approaching when the inquirer will not

expect to receive everything that a more leisurely scholar could have expected. How, and how far, is this choice to be exercised for him? Is it expressible solely in subject parameters? Or is there something connected with personality and temperament that should be applied as a screen, after an objective specification has been met? Here is room for the psychologist, to tell us how concepts are formed, and how much further doubt may remain hidden within an overt expression of doubt. The librarian knew his patients; the machine will not. Or perhaps it will read the inquirer's character at the same time as it reads his handwriting!

Facility in the organization of concepts and their hierarchies is but one step along the road. Such organization can indeed bring within the compass of a machine the exhaustive collection of references to (say) 'cruelty to dogs'. The synonyms and species can be gathered for both 'cruelty' and 'dogs'. But there remains the inquirer for references to 'sadism' and, for that matter, the inquirer for 'cruelty *by* dogs'. It is difficult to see how these gaps can be closed except in the sense that a system (be it machine or moron) could be taught the necessary associations *as they arose* in the course of its work, and might (I suppose) if its core-store were large enough, eventually achieve graduate status. But to *generate* such associations, as opposed to merely recording them, presupposes a more articulate understanding of meaning than we possess today.

The active future seems unlikely to wait for a complete codification of our everyday semantics and syntax. I suspect that the time-honoured Author Index was an early symptom of impatience, and certainly the new concepts of the Citation Index and of Bibliographical Coupling seem to be valuable additions to the desired complex of bridges between ignorance and awareness. Over a limited period of years at any rate an author's name can be a convenient, though not infallible, substitute for quite a galaxy of associated subject terms. And the device of finding quickly all citations of a known starting document is a very direct route to its most responsive recipients. Of course, the system has its equivalents to 'false drops'. It is because all our bridges have loose planks that I favour a delta of bridges!

With this confused mixture of understanding and bewilderment, and the concomitant doubt as to how best to dispose resources—be they physical or human—what prospect faces the new entrant to the profession today? Let us start soberly. Information science, information technology ('informatics', to quote a Dutch friend), is still an alchemy. It stands no better than chemistry stood before John Dalton's unifying concept of the atom. That *his* atoms are not *our* atoms is not yet of workaday significance—and may it never be! From his theory chemistry was able—and still is able—to advance with confidence. We still await the Dalton of the information world. His place in history will be no less respected. Where is this sorely needed figure today? In the nursery, in a sixth form, in a postgraduate school—or facing me at this very moment?

At no period in history has the organization and service of information been so important a subject, or so pregnant with new possibilities. Important because of the need for records that are complete, articulate, unambiguous and minimal; the machine will not provide that second line of defence which has been the pride of the loyal clerk or secretary. Pregnant because, at last, an

awareness of information and its value and its problems is spreading amongst disciplines and amongst professions; amongst universities and amongst industries and amongst Government departments.

Nor has the message gone unheard. To take but a few examples. The number of full-time students now preparing for the examination of the Library Association is ten times the 1960 figure. At least three British universities now offer a first degree course in Library and Information Work. The Council for National Academic Awards has set up a specialist Board to consider proposed courses from colleges, designed to lead to CNAA degrees in the theory and practice of library and information work. Careful and patient attention is being given to the design of these courses in the full knowledge that those who take them will be called upon to dispense a highly technical expertise in a wholly human cause and environment. The Department of Education and Science, through the Office for Scientific and Technical Information, is making extensive grants to support both operational and theoretical studies in the frontier areas of the subject. There is scarcely a substantial organization in the country—nay, in the whole civilized world—that has not taken the first steps towards a better understanding of these challenging problems, and of the inevitable role of the computer in their solution.

I have tried in a few brief moments to outline what, to me, is the heart of the problem—shorn of those technical and technological factors which must largely shape any and every manifest solution. I am only too well aware that others would place the heart elsewhere—such indeed is our ignorance of the physiology of our own art. I mean no disrespect, therefore, to other viewpoints if I make no immediate digression on their behalf. An annual lecture is a curious occasion, where one must steer between the Charybdis of the 'review' and the Scylla of the 'conference paper'—and not mark one's passage by leaving a mess on the beaches!

We are then at the beginning of a great co-operative endeavour, within which few single contributions or events can command more than a passing nod. The full force of human resources has not yet been marshalled to the task. It is not wholly a matter of numbers, although a trained force of sufficient size is certainly an immediate need. More important than numbers is the need to enlist the interest of other skills and disciplines, both as users and as investigators. This, I believe, is what should give our subject a contemporary appeal for the young people of today. One observes a sharp reaction against the narrow specialization that characterized so much of technical education in my own generation. One sees the newer universities trying gallantly to put a student's specialization into a rational social perspective. It is not just a matter of teaching a scientist to enjoy Brahms: he can get around to that for himself. But he needs to develop enough breadth of view to appreciate the techniques, the frustrations and the triumphs of intellects engaged with a wide variety of media. And the various converses apply equally to other specialists. In information work this receptivity of mind has a functional as well as a social or administrative purpose. It is a part of its joy, a part of its way of life, that wide intellectual communion is a necessity. One needs (apart from expertise in some chosen subject area) only the will to listen critically, to challenge fairly, and to assess objectively. To distinguish

between 'hunch', 'hypothesis' and 'proof' and to state frankly at what level one is contributing.

I have tried to indicate that one of the attractions of the present phase of the subject is that it must draw together contributions from a wide variety of experts. In the past, our work has been largely a matter of human dedication—the work of the 'amateur', in the most literal and honourable sense of this term. We may regret in passing that man showed so little communal concern in the preservation of his hard-won fruits; but folly is one of man's most faithful companions!

Information science will become an organized work-a-day activity for the same reason that other sciences became so. Chemistry germinated because man is a curious animal: it flowered because business, construing human demands, needed it. Similarly with biochemistry, electronics and a host of others. When I say 'business' in this context I do not consciously imply only profit-making business. The service needs of business are no less the needs of other organized endeavour. It is axiomatic that hospitals, schools, police forces, transport services, departments of state, should all command immediate and reliable information. This is not to say that they have not striven for it in the past. But they too are in the blast area of our explosion.

The need for organized information is being articulated simply because it is becoming realized that unorganized information is *no* information. The corollary has followed logically and promptly. The required corps of experts does not exist—nor indeed do adequate and appropriate facilities yet exist for its rapid creation. These very subjects are occupying many distinguished members of this audience throughout this week. May all possible success attend their deliberations.

The advance guard who struggle through a rather daunting wilderness may not see the promised land. But they know that it is there for those who will seek; and that which is there, man usually finds sooner or later. The quest will be exciting for those who see things that way; deeply interesting for the less emotional; satisfying for the bucolic. All talents, all temperaments, all skills can play a part, for it is concerned with what is basic and essential to man's further ascent, namely his ability to *communicate* constructively with his fellows.

It is inspiring for the future of our subject that some of its most profound thinking has come from civilizations that some might call outworn and from places that some might call underdeveloped or negligible. Similarly, some of the foremost exploratory operations in this field have been performed without the anaesthesia of a traditional university degree.

Tomorrow belongs to the team—to a new sort of team—the intellectual team with a taste for intense and patient argument. They must come from all manner of sources and their composition will vary from phase to phase of their work. The subject-specialist must be there; the psychologist ought to be there; the structural linguist, the statistician, the publisher, the printer, the photographer, the microscopist, the biologist, the neurologist, the historian, the economist, the cost accountant, the systems analyst, the computer designer and the molecular biologist should be there. What a line of forwards! Surely they cannot fail to score a try—and to make a successful conversion!

It would be clearly impossible, within a discourse of this kind, to enumerate all the possible forms that mechanically aided systems could, and indeed will, take. That there will continue to be a variety, even when our theoretical ideas are more complete, may be taken for granted. Differing scales and resources are sufficient to ensure diverse manifestations. But all will take account of associated developments elsewhere, and of these the following are the most insistent apparitions in my particular crystal ball:

1 The moment of keyboarding text for publication is an attractive moment for creating a machine-readable record—whether for the purpose of later computer typesetting or not. The cost of key stroking is far from negligible; the advantages of making two types of record at one operation are self-evident—and seductive.

2 This factor (which is economic as much as technological) must inevitably favour the use of free-text—though probably not full-text—at input. The unpopularity of indexing as an occupation will reinforce this trend.

3 Closer study of user behaviour should promote a greater frankness and sympathy between inquirer and system. Freed from inhibiting diffidence, the user will wish to employ an iterative technique, returning to the system many times with more enlightened requests and instructions.

4 Computer developments will be such as to encourage such iterative procedures, in the so-called 'conversational mode'. After all, such a system will use more computer time and will require larger stores. The frightening cost will be moderated by shared access.

5 Iterative interrogation of text by machine will call for something more elaborate than the vocabulary or thesaurus of the co-ordinate indexers. It will be less a list of terms and more a complex of intermeshing semantic networks. These networks will need to be semantically dynamic, and, to a large extent self-generating, for they will have to live with man's ingenious use and abuse of language. Exponents of the virtues of classification will return to the fray—lending their undoubted achievements to the classification of concepts rather than of documents.

I would like to acknowledge the apparent plagiarism in what I have just said. It was not until after I had composed this talk that I had the pleasure of reading the paper that Mr Farradane presented on Monday. I share his faith in the re-emergence of classification: and I would like to use this moment to quote another passage from his paper that should, I believe, find a place in the Book of Wisdom. He says 'The information scientist ... is essentially a user, not an organizer of libraries'. How very true!

6 These network thesauri will not be developed quickly. Apart from the clear semantic difficulties, the associated problems of software and file organization would appear to be not trivial and will, of course, have to be tackled in the midst of changes from tape storage to disc storage and from serial access to random access.

7 Responsible scepticism will ensure the continuation of work towards the perfecting of indexing languages, the human seeking an algorithm for the manipulation of syntax while the machine hunts for verbal substance by statistical methods. In the long run, deficiencies of the built-in network

thesauri may sometimes have to be made good by an enrichment based on either human or machine analysis of full-text, but this latter treatment will tend to become reserved for cases of special difficulty or importance.

At the same time, there may remain situations where a formalized representation of the reference is the only feasible treatment, despite the incidence of false drops. To re-quote one of my favourite analogies, if one is in unfamiliar territory, start with the one-inch map, work down to the ten-inch map, and then start the footwork.

It is, I believe, too much to hope that an inquirer will always be able to find a non-stop flight between his speciality and another. To this extent there will continue to be redundancy in both coverage and system. But once the schedules are stabilized the regular travellers will know all the possible and attractive stop-over points.

8 Since a variety of systems and sub-variants will co-exist for a long time, techniques for making valid comparisons between systems will continue to be developed, and will be eagerly and widely discussed. The notions of recall and relevance seem likely to become the cornerstones of our emerging discipline. Relevance must acquire more objectivity. The user is entitled to be the ultimate judge, but his unrefined personal reactions are not always helpful to the evaluation of the automatic elements of a system.

9 Nor is it only in the underwear department that competition and controversy will rage. Given a satisfactory complex of discriminators, and given efficient software for an electronic confrontation of customer and stock, there is still the matter of how much further the service should go.

Ideally, the customer wants 'what he wants'. Unless it be data, he usually cannot *specify* what he wants—he can only describe it. 'Information' is a strange commodity. It isn't there except when you are looking at it. And even then it doesn't look the same to you as to me. So, unless we insert a Boswell between Dr Johnson and the robot, our wares will still be documents, or parts of documents. And, even then, Boswell will need documents.

This leaves a fine problem of storage and display where, once again, the interplay of technology and economics will give us an equation having many roots. Shall the text be stored on tape or disc, and be regenerated as required by printing or on a CRT, or shall the computer co-operate with microfilm or microfiche, calling up the required frames for our inspection? Can our irrational distaste for microform be overcome? Would it help to make the micro-reader look like a television set and put a slight flicker into the picture? What place in all this has the micro-micro record—the Bible on two square inches of film? Can we all have a special library on our desks with a short-wave connection to an orbiting computer that first selects and then commands local display? The choice between integrated display and delegated display will call for some of man's most elegant ingenuity and for alert vigilance of the contributing technologies.

10 In the midst of these gropings towards the light the average individual information officer will still have to look for lost needles with a small candle. At least, it will seem so to him on his off-days: for man's ability to grumble has never lagged behind his ability to progress. But by attention to the

doings of his information colleagues—both in the research and in the operational spheres—he will become less of a do-it-yourselfer than hitherto. He will not, or should not, surrender his personal concern for ensuring that his collection is appropriate to its purpose; but his 'collection' will become less a physical store and more a list of telephone numbers and call points. Many of his subscriptions will be not to publications but to commercially offered search services. He will be strongly tempted to add these incoming tit-bits to his own in-house retrieval system. He must resist the temptation unless the material clearly belongs in his universe.

The old boy network, the invisible college, the grapevine, will not disappear in this welter of asceptic, antibiotic decontamination. Rather, we shall all become members of a much larger 'club'. If I may be allowed to abuse the motto of a highly respected organization: 'Nation shall give information unto nation'.

11 Some may feel that I have been beastly to the computer. Not so: I have tried only to put a sense of humour in the way of its becoming a Golden Calf. For a more responsible assessment I would prefer to quote:

'Communication is basically a behavioural phenomenon, and we should guard against an overemphasis of formalism and mathematical models, especially when they ignore this fact. There is no doubt that language behaviour, and communication through it, will ultimately submit to rigorous formulation. Though this will greatly increase our insights and capabilities with language, we must not ingore the matchless capability of humans to operate effectively with *imprecise* language devices. Hence, the potential and proper place of the human being must always be taken into account in the design of information-handling systems. It is entirely predictable, for example, that computer-aided human indexing and interrogation will be qualitatively and economically superior to fully automatic methods.'

I have read no more sober or realistic assessment of the matter, and I warmly salute its author—Phyllis Baxendale of IBM.

Enthusiasm for a subject cannot be transmitted by exhortation: there is nothing more boring than the technicalities of someone else's expertise. I have tried to offer a sketch of what there is, and may be, in the arts of information, so that a few people may be saved from saying 'They never told me: I wish I had known'. If I have conveyed, however poorly, the undoubted intellectual challenge that it offers, I hope that the message will be relayed by those of you whose task it is to display the world of employment to the uncertain entrant.

The fascination of the subject cannot be rationalized. But its importance needs no emphasis from me. To put the point at its most dramatic: if it should ever come about that the notional button is pressed there could be but two possible reasons—insanity, or lack of information.

In conclusion, ladies and gentlemen, and to some extent in self-defence, I would like to quote from this week's issue of my favourite bedside journal:

'If the student leaves the lecture theatre without a single fresh fact fixed in his head, but with some small degree of added feeling for the subject, then the lecturer has won that round.'

THE CRANFIELD TESTS ON INDEX LANGUAGE DEVICES

CYRIL CLEVERDON

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Evening meeting, London, Thursday 27th April 1967

The investigation dealt with the effect which different devices have on the performance of index languages. It appeared that the most important consideration was the specificity of the index terms; within the context of the conditions existing in this test, single-word terms were more effective than concept terms or a controlled vocabulary.

THE first Aslib-Cranfield project attempted to investigate the operational performance of four different indexing systems, namely the Universal Decimal Classification, a facet classification, an alphabetical subject catalogue and the Uniterm system of co-ordinate indexing.[1,2] In terms of performance, it was found that all systems operated at very much the same level of efficiency.

In the course of this first project, an evaluation was made of a test collection of some 1,100 documents in the index of metallurgical literature of Western Reserve University, and comparison was made with a faceted index, covering the same set of documents, that was compiled at Cranfield.[3] The results from these tests were to establish the measures that can be used in evaluating the operational performance of information retrieval systems. The two measures, namely *recall ratio* and *precision ratio*, were not only important in themselves, but provided a clue to the composition of index languages, for detailed analysis of the results of the two tests showed that each indexing system was made up of a basic vocabulary together with a number of devices. These devices fall into two main categories; there are *recall devices*, which are intended to increase the probability of retrieving more relevant documents. Examples of such recall devices are the grouping of synonyms, the confounding of word forms, or the formation of classes of related terms. On the other hand *precision devices* are intended to ensure that non-relevant documents are not retrieved, and examples of such precision devices are co-ordination (whether pre-co-ordination or post-co-ordination), links and roles.

The analysis of the test results in Cranfield I showed that all indexing systems were an amalgam of recall and precision devices, and that these interacted with each other in such a complex manner that it was impossible to measure their effect on the overall performance of any indexing system. The Universal Decimal Classification, for instance, is a very complex system, and includes

every possible device. It incorporates recall devices, such as the control of synonyms, by means of the alphabetical index:

e.g.	Air Cushion Vehicles	629.137
	Ground-effect machines	629.137
	Hovercraft	629.137

Word forms are also brought together by the alphabetical index:

e.g.	Weld	621.791
	Welded	621.791
	Welding	621.791

Generic relations are shown in the schedules:

e.g.	662	Beverages
	662.3	Wines

Pre-co-ordination of terms frequently occurs in the schedules:

e.g.	533.6.071	Wind tunnels
	533.6.071.4	Wind tunnel instruments

Alternatively, co-ordination can be obtained by the use of the colon sign or brackets:

e.g.	338:633.1	Cereal production
	942(42)	English history

Links are also shown by the colon sign:

e.g. 669.71 : 621.791 Welding of aluminium

Roles are indicated by the context of the schedules:

e.g.	*Input*	Wood (fuel)	662.63
	Output	Wood (forestry)	634.08

The second Cranfield project was therefore designed to investigate such index language devices in isolation and in all practical combinations, and attempt to measure the effect which each device had on performance. For this purpose a test collection was established consisting of 1,400 research papers, mainly in the field of aerodynamics. Each document was 'indexed' in three different ways (Fig. 1); first, the most important concepts were selected and were recorded in the natural language of the document. The single words in each of the concepts were then listed, and finally the concepts were combined in different ways to form the main themes of the documents. At the time of indexing, each concept was given a 'weighting' (1, 2 or 3) to indicate its relative importance. The concepts in the main theme of the document would be weighted '1', the less important concepts '2' and the minor concepts '3'.

For the testing, 221 questions were used, these being questions which had been provided by the authors of a number of research papers. The first task was to determine the relevance of every document in the collection to each of the questions. The relevance decisions, which were finally decided by the originators of the questions, were in a scale of from 1 to 4, which had the following requirements.

1. References which are a complete answer to the question.
2. References of a high degree of relevance, the lack of which either would have made the research impracticable or would have resulted in a considerable amount of extra work.

B1590	AUTHOR STONE, A. TITLE Effect of stage characteristics and matching on axial flow compressor performance	Indexer J.M.	Date 17-6-63
Base Document A137	REFERENCE *Trans. American Soc. of Mechanical Engineers*, c–, 1958, p. 1273		

THEMES (*partitioning*)		CONCEPTS (*Interfixing*)		CONCEPTS (*Interfixing*)		TERMS & WEIGHTS		TERMS & WEIGHTS	
A	cd *effect of* a *use of* ef	a	Stage characteristics	t	Range of operations	Stage	1	Blade	3
B	——— b ———	b	Stage matching	u	Stage flow co-efficient	Characteristic	1	Range	2
C	cdh	c	Axial flow compressor	v	Mass flow	Matching	1	Operations	2
D	cdi *effect of* j *with* k	d	Stage performance	w	Choking flow co-efficient	Axial	1	Mass	2
E	cdl *effect of* g	e	Test data			Flow	1	Choking	2
F	cmp *effect of* n	f	Analysis	x	Surge line	Compressor	1	Line	2
G	———vo	g	Mach number	y	Change in slope	Performance	1	Slope	3
H	cmdq	h	Velocity distribution	z	Knee double valued performance curve	Test	1	Knee	3
I	cmdr	i	Temperature co-efficient			Data	1	Double	3
J	cmdt *effect of* sg			aa	Unstalling hysteresis	Analysis	1	Curve	3
K	cmu *effect of* g	j	Flow co-efficient		Inlet guide vane stagger	Mach	2	Unstalling	3
L	———v	k	Constant flow angle	bb	Uprating stage one	Velocity	2	Hysterisis	3
M	cbv *effect of* w	l	Cascade losses		Uprating stage two	Distribution	2	Inlet	3
N	cbx *effect of* o	m	Idealized compressor		Blade stagger	Temperature	3	Guide	3
O	cbxy *effect of* o	n	Total pressure ratio	cc	Stage loading	Co-efficient	3	Vane	3
P	cbz *effect of* aa	o	Percentage of design speed	dd	Annular area	Constant	3	Stagger	3
Q	cu *effect of* bb			ee		Angle	3	Uprating	3
R	———cc	p	Performance	ff		Cascade	3	One	3
S	———dd	q	Stalling point	gg		Loss	3	Loading	3
T	cx *effect of* ee	r	Compression surges			Idealized	2	Annulus	3
U	———ff	s	Pitch line blade speed			Total	3	Area	3
V	———gg					Ratio	3	Number	2
W	———vq					Percentage	2	Line	3
						Design	2	Valued	3
						Speed	2	Two	3
						Stalling	2	Pressure	2
						Point	2		
						Surge	2		
						Pitch	3		

FIGURE 1 INDEXING SHEET FOR DOCUMENT 1590

3. References which were useful, either as general background to the work or as suggesting methods of tackling certain aspects of the work.
4. References of minimum interest, for example, those that have been included from an historical viewpoint.

In a normal search, the document collection is divided into two groups, consisting of the documents that are retrieved and the documents that are left in the system. Each of these groups can be subdivided into those documents that are relevant and those documents that are not relevant. This is usually presented as in Fig. 2.

	RELEVANT	NON-RELEVANT	
RETRIEVED	a	b	a + b
NOT RETRIEVED	c	d	c + d
	a + c	b + d	a + b + c + c = N (Total Collection)

FIGURE 2 2 x 2 CONTINGENCY TABLE

For the purpose of evaluating an information retrieval system, performance is presented by plotting the recall ratio $\left(\frac{100a}{a+c}\right)$ against either the precision ratio $\left(\frac{100a}{a+b}\right)$ or the fallout ratio $\left(\frac{100b}{b+d}\right)$. The fallout ratio is particularly useful when comparing performances of document collections of different sizes, but the precision ratio is more satisfactory for most of the results obtained in the Cranfield work.

Three main types of index language were investigated. For the first, single terms only were used; examples of these are given in the final columns of Fig. 1 and all such terms are in the natural language of the documents. It was these natural language terms which were used for the basic index language of this type; for the second Single Term index language, synonyms were grouped; for the third, word forms were confounded. Further Single Term index languages had groups of terms based on different hierarchical classes (Fig. 3).

The second main type of index language used the concepts as given in Fig. 1, with some slight simplifications; again the basic Simple Concept index language used these terms as they occurred in the documents, and fourteen other index languages were formed on the basis of various groupings of these terms (Fig. 4). The third main type consisted of six different index languages which were based on various groupings of a set of controlled terms (Fig. 5).

In addition, there were four further index languages where the index terms represented all the key words in the titles or in the abstracts. In each case these were tested in the natural language and with word forms confounded.

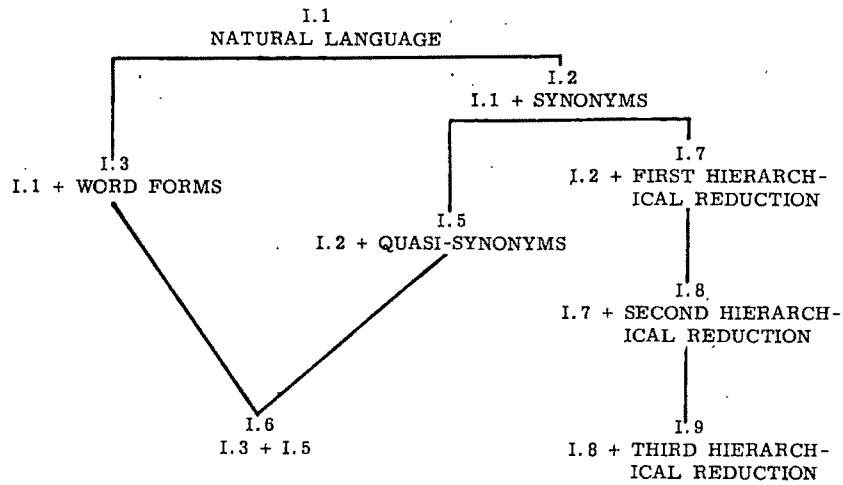

FIGURE 3 SINGLE TERM INDEX LANGUAGES

The searches were carried out in such a way that there was absolute consistency, except for a single variable, such as the index language or the search rule or the relevance decision. Consider, for instance, the question '*Small deflection theory* of *simple supported cylinders*'. This is the question exactly as stated by its originator, and it contains six key terms. With the basic single term index language, the first search was made for a match in all six terms, and this retrieved three documents. For a match of any five terms, ten documents were retrieved; for a match of any four terms fourteen documents were retrieved; forty-three documents were retrieved at a match of three terms, 177 documents at a match of two terms and 722 documents when any single term was accepted on its own.

For comparison we consider the results obtained with Index Language 1.6; in this case the change is that the single terms are grouped into classes formed by synonyms, word forms and quasi-synonyms. It is now found that at a match of all six terms, four documents have been retrieved; at a match of five terms, fourteen documents were retrieved; for a match of four terms, thirty-eight documents were retrieved; 125 documents were retrieved at a match of three terms, this being nearly three times as many as were retrieved at this level with Index Language I.1. However, in this particular case, whereas only two of the six relevant documents were retrieved at a match of three with Index Language I.1, five relevant documents are retrieved with Index Language I.6.

When the results of a number of searches are aggregated, test results are obtained which can be presented in the manner shown in Figs. 6 and 7. The single variable in these two sets of results is the index language; Fig. 6 shows the results for Index Language I.1, which used single terms in the natural language. Figure 7 presents the results for Index Language I.6 where the single terms are grouped into classes formed by synonyms, word forms and quasi-synonyms.

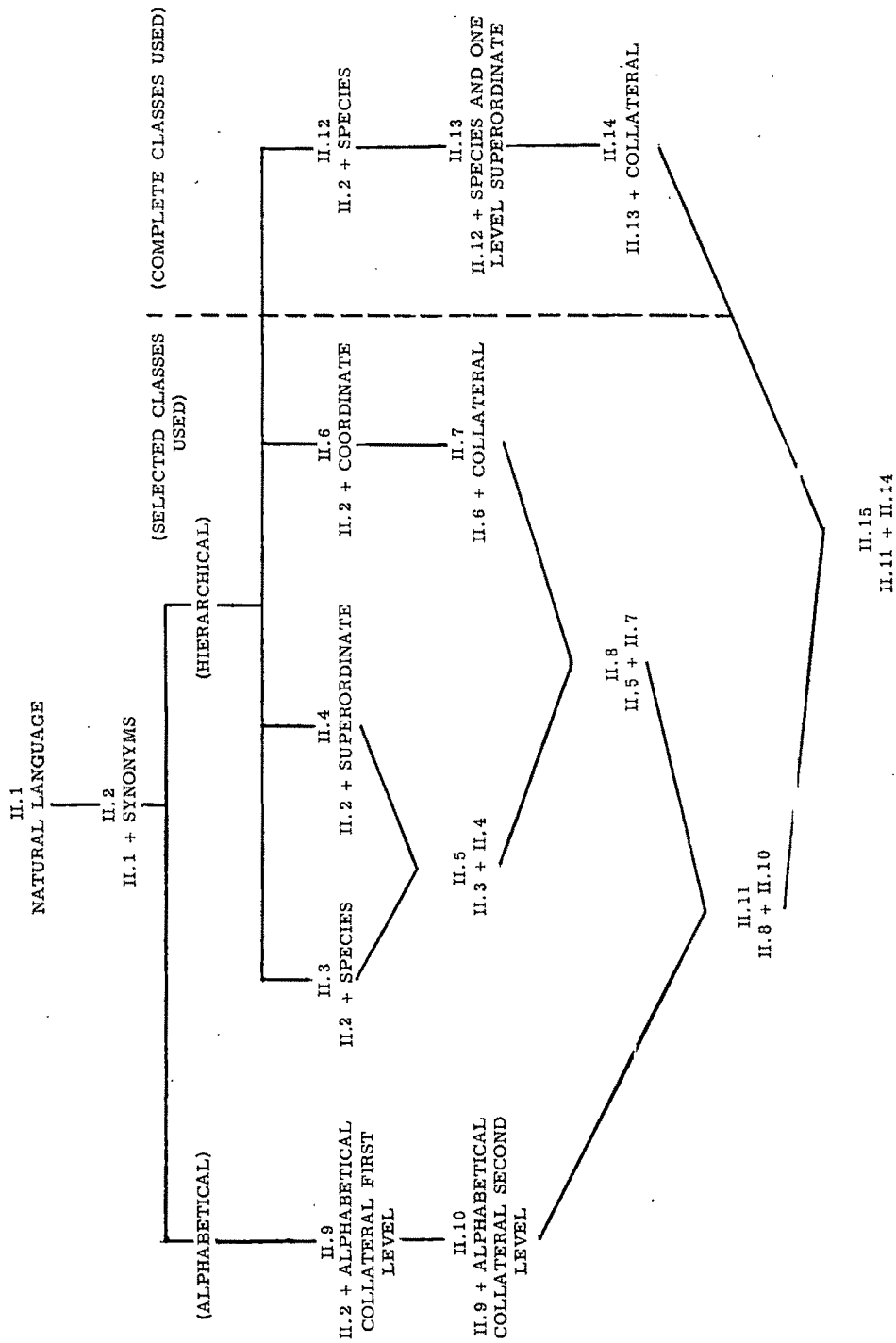

FIGURE 4 SIMPLE CONCEPT INDEX LANGUAGES

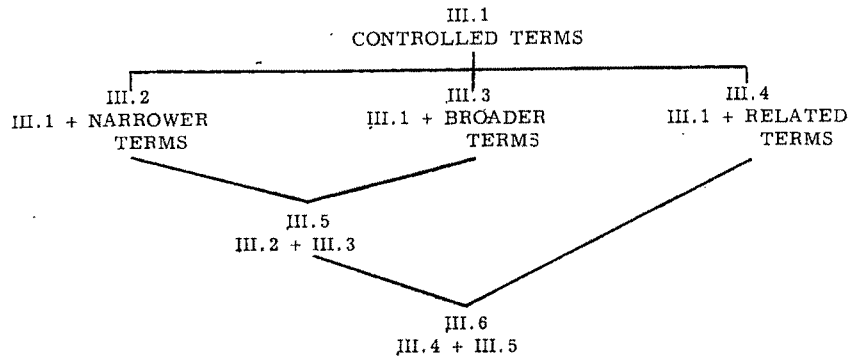

FIGURE 5 CONTROLLED TERM INDEX LANGUAGES

The tables show the number of relevant and non-relevant documents retrieved at various coordination levels and from these figures are calculated the recall ratio, the precision ratio and the fall-out ratio.

These two sets of results can be presented on a recall-precision plot as in Fig. 8; from this it can be seen that at any given recall ratio up to 95 per cent, Index Language I.1 has a higher precision ratio than Index Language I.6.

In addition to the results of the type already shown, many further tests were made to determine the effect of different variables. Figure 9, for instance, shows the effect of introducing certain rules concerning the search strategy, and Figure 10 is a plot showing the effect of the four different levels of relevance. In this latter case a plot showing recall and fall-out ratios is presented. This is done because the effect of changing the relevance levels is to alter the number of relevant documents and thereby change the generality number. Due to this change in generality number, a recall/precision plot would have shown the best performance with documents relevance 1–4 and the worst performance with documents relevance 1. While it is practical to make the necessary adjustments in precision ratio, the fallout ratio automatically compensates for the change in the generality number and correctly shows that the best performance is obtained with relevance 1 documents.

The plots and the test results illustrate the inverse relationship, first postulated in the earlier Cranfield work,[2] which exists between recall and precision. Whereas the maximum possible recall ratio of 100 per cent can be obtained by, if necessary, looking at every document in the collection, the inevitable effect of bringing about any improvement in the precision ratio is a drop in the recall ratio. In reverse, if one wishes to increase the number of relevant documents which are being retrieved, this can only be done by increasing to a greater extent the number of non-relevant documents also retrieved. This is always the case when operating within any given system, although it does not, of course, apply for comparisons between different systems.

It is estimated that some 300,000 test results were obtained in the project, and while the results appeared consistently to show the same trends, it was difficult

Index Language I.1.a. (S.T. Natural language. Coordination)

Exhaustivity of Indexing 3
Search Rule A
Document Relevance 1-4

Number of Documents in Collection 1,400
Number of Questions 221 (Subset 3)
Number of Relevant Documents 1,590
Generality Number 5.1

Coord-ination Level	Documents Retrieved Rel.	Documents Retrieved Non-rel.	Recall Ratio a/a+c	Precision Ratio a/a+b	Fallout Ratio b/b+d	x	y	z
1	1,510	159,122	95.0%	0.9%	51.696%	221	221	221
2	1,283	58,122	80.7%	2.2%	18.883%	221	221	221
3	946	21,933	59.5%	4.1%	7.125%	215	220	220
4	606	7,359	38.1%	7.6%	2.390%	187	212	212
5	314	2,380	19.7%	11.6%	0.773%	131	197	197
6	154	699	9.7%	18.0%	0.227%	86	164	164
7	74	216	4.7%	25.5%	0.070%	50	140	140
8	22	43	1.4%	33.8%	0.014%	18	105	105
9	8	5	0.5%	61.5%	0.002%	8	78	78
10	1	0	0.1%	100.0%	0.000%	1	52	52
11	0	0				0	32	32
12	0	0				0	15	15
13	0	0				0	8	8
14	0	0				0	4	4
15	0	0				0	3	3

FIGURE 6 RESULTS OF SEARCHES USING INDEX LANGUAGE I.I

Index Language I.6.a (S.T. Synonyms, Quasi-synonyms, Word forms. Coordination)

Exhaustivity of Indexing 3
Search Rule A
Document Relevance 1 - 4

Number of Documents in Collection 1,400
Number of Questions 221 (Subset 3)
Number of Relevant Documents 1,590
Generality Number 5.1

Coord-ination Level	Documents Retrieved Rel.	Documents Retrieved Non-rel.	Recall Ratio a/a+c	Precision Ratio a/a+b	Fallout Ratio b/b+d	x	y	z
1	1,557	(-)	97.9%	(-)	(-)	221	0	221
2	1,430	116,374*	89.9%	1.2%*	37.783%*	221	44*	221
3	1,165	45,101*	73.3%	2.5%*	14.643%*	218	109*	220
4	848	18,373*	53.3%	4.4%*	5.965%*	206	142*	212
5	503	8,895*	31.6%	5.4%*	2.888%*	169	177*	197
6	295	3,874*	18.6%	7.1%*	1.257%*	119	161*	164
7	161	1,136	10.1%	12.4%	0.369%	83	140	140
8	72	344	4.5%	17.3%	0.112%	54	105	105
9	24	82	1.5%	22.6%	0.027%	25	78	78
10	6	18	0.4%	25.0%	0.006%	12	52	52
11	0	1	0.0%	0.0%	0.0003%	1	32	32
12	0	0				0	15	15
13	0	0				0	8	8
14	0	0				0	4	4
15	0	0				0	3	3

FIGURE 7 RESULTS OF SEARCHES USING INDEX LANGUAGE I.6

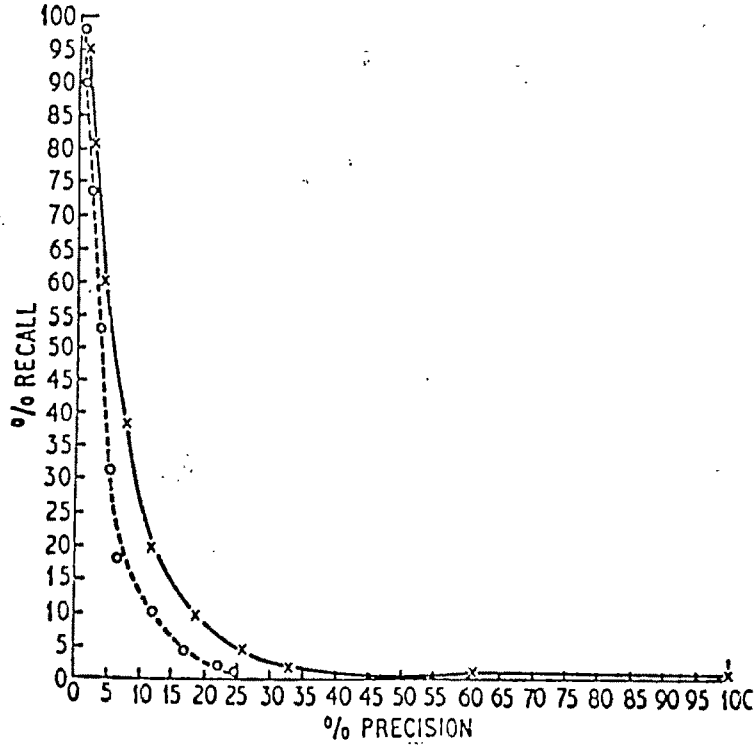

FIGURE 8 RECALL/PRECISION PLOT FOR INDEX LANGUAGES 1.1 AND 1.6 AS GIVEN IN FIGURES 6 AND 7

to present them in a manner which gave a direct comparison between the different systems. Many proposals have been made for a single performance measure, and a large number of these were considered in detail in the project report.[4] All these measures had a similar weakness in that they could only represent a single recall/precision point. This meant that a 'score' of, say, 85 might imply a recall ratio of 80 per cent and a precision of 5 per cent, or a recall ratio of 20 per cent and a precision ratio of 65 per cent or any other of a whole series of single points. The emphasis in the Cranfield work has been on the overall performance of a system which is obtained by changing a single variable, such as the co-ordination level; this produces a series of points giving a performance curve as already shown in Figure 8, and it was this overall performance which we wished to compare. The answer lay in a form of the normalized recall ratio as first used by Professor Salton.

The investigations undertaken by Salton with the SMART system[5] were basically similar to those which were being done at Cranfield. In both cases the intention was to compare the effect of using different devices or options, but there were, of course, important differences, apart from the fact that Salton used a large computer while Cranfield used simple but laborious clerical techniques

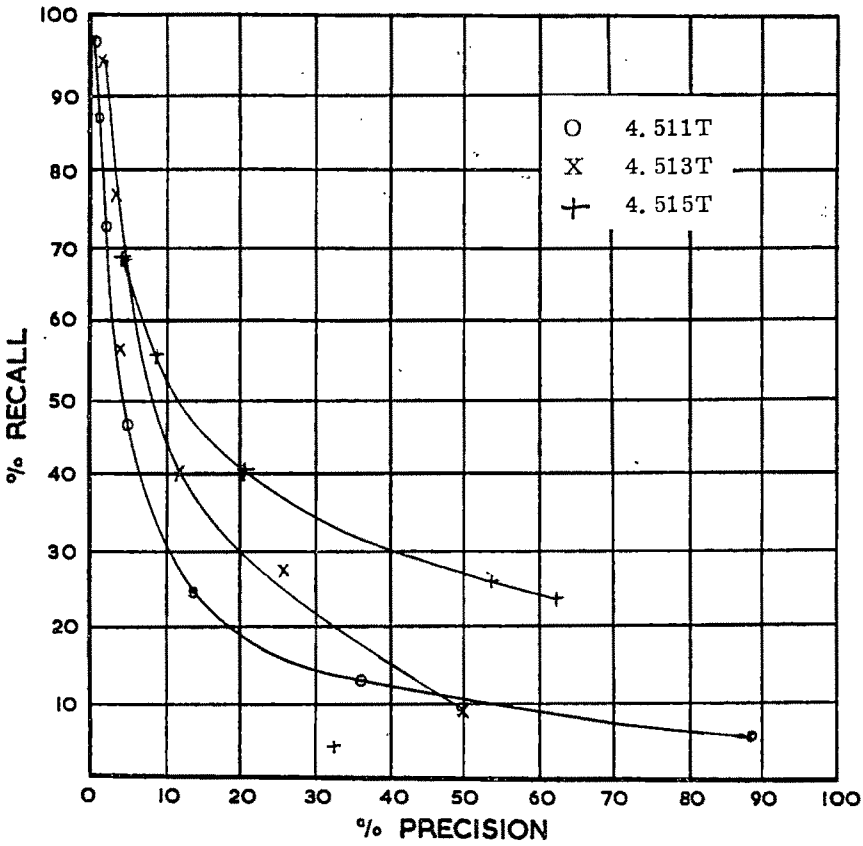

FIGURE 9 EFFECT ON PERFORMANCE OF CHANGES IN SEARCH RULES

for carrying out the test searches. The significant difference lay in the fact that the SMART programmes had the facility of being able to present an output in a ranked order of probable relevance (Fig. 11). It was this which enabled Salton to calculate the normalized recall ratio, which is based on the sum of recall ratios calculated after the recall of each single document, and thereby enable direct comparison between systems.

At Cranfield, such direct comparison was difficult, because the measures were calculated at co-ordination level cut-offs, the effect of which was that (as in the example given earlier) at a given co-ordination level, System A might retrieve fourteen documents while system B would retrieve thirty-eight documents. This variation in the number of documents retrieved effectively stopped any direct comparison, whereas the ranked output presented by SMART made it possible to ascertain the performance after, say, five documents had been retrieved, after ten documents or any other number.

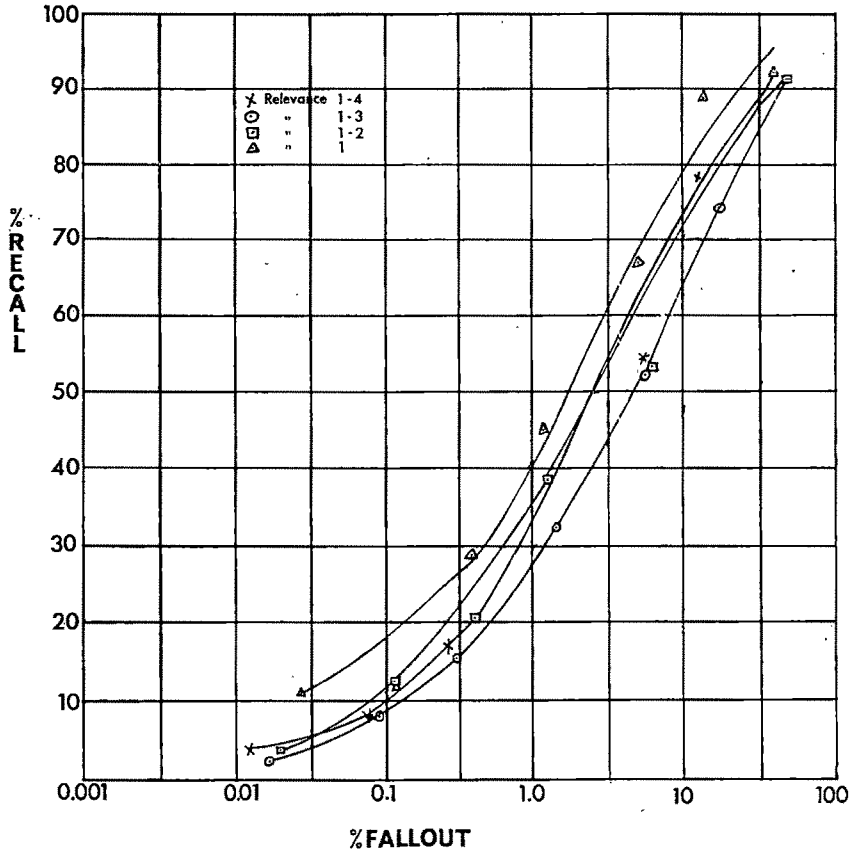

FIGURE 10 EFFECT ON PERFORMANCE OF VARIATIONS IN DOCUMENT RELEVANCE (RECALL/FALLOUT PLOT)

Therefore, the first task was to obtain a simulated rank output for the Cranfield searches. The method adopted was based on the retrieval of relevant and non-relevant documents at each co-ordination level. If we consider the results for Q.100 when searched in a collection of two hundred documents, the position is as follows:

	Documents retrieved	
Co-ordination level	*Relevant*	*Non-Relevant*
1	1	2
2	3	50
3	3	71
4	4	167

By using such figures, a rank order number could be assigned to each relevant document by means of the equation

$$c_{R_n} = X_c + (n - Y_c)\left(\frac{x_c + 1}{y_c + 1}\right)$$

where c_{R_n} is the rank order number of the nth relevant document to be retrieved

c is the co-ordination level at which the *nth relevant document* is retrieved

x_c is the additional number of *documents* retrieved at coordination level c. (i.e. those not retrieved at a higher co-ordination level)

y_c is the additional number of *relevant documents* retrieved at co-ordination level c. (i.e. those not retrieved at a higher co-ordination level)

X_c is the total number of documents retrieved before searching at co-ordination level c. (i.e. at higher coordination levels)

Y_c is the total number of *relevant documents* retrieved before searching at co-ordination level c. (i.e. higher co-ordination levels)

c_{R_n} is taken to the nearest whole number but if its value falls exactly between two whole numbers, it is taken to the lower whole number for odd numbered questions and to the higher whole number for even numbered questions.

ABSTR NEW QS TOP 15 RELEVANT				INDEX NEW QS TOP 15 RELEVANT				CRAN CONCON INDEX F NULL TOP 15 RELEVANT			
1	792	7	712	1	792	3	712	1	597	6	708
2	797	19	711	2	683	69	708	2	792	25	712
3	799	97	713	3	712	80	711	3	717	46	711
4	324	101	708	4	797	139	713	4	799	102	709
5	683	149	709	5	988	153	709	5	748	136	713
6	992			6	572			6	708		
7	712			7	437			7	316		
8	707			8	799			8	451		
9	416			9	682			9	11A		
10	321			10	675			10	37I		
11	655			11	670			11	683		
12	33H			12	316			12	10A		
13	874			13	681			13	670		
14	316			14	701			14	916		
15	919			15	707			15	08D		
RNK REC	= 0·0402			RNK REC	= 0·0338			RNK REC	= 0·0476		
LOG PRE	= 0·2509			LOG PRE	= 0·2433			LOG PRE	= 0·2605		
NOR REC	= 0·6328			NOR REC	= 0·5600			NOR REC	= 0·6923		
NOR PRE	= 0·3390			NOR PRE	= 0·3115			NOR PRE	= 0·3717		
OVERALL	= 0·2911			OVERALL	= 0·2771			OVERALL	= 0·3081		
NOR OVR	= 0·3390			NOR OVR	= 0·3115			NOR OVR	= 0·3717		

FIGURE 11 EXAMPLES OF RANKED OUTPUT OBTAINED WITH SMART FOR QUESTION 147

Q	REL	1	2	3	4	5	6 -7	8 -10	11 -15	16 -20	21 -30	31 -50	51 -75	76 -100	101 -125	126 -150	151 -175	176 -200
79	3	x									x					x		
100	4		x							x	x					x		
116	6							x		x	x	x	x		x			
118	5	x					x	x			xx							
119	6			x		x	x				x		xx					
121	3	x	x	x														
122	5	x				x		x			x	x						
123	4	x		x		x											x	
126	2	x	x															
130	4	x						x	x		x							
132	4				x							x			x		x	
136	6		x	x		x	x	xx										
137	6		x			x		xx	xx									
141	1	x																
145	12	x	x	x	x			x	x	x		xxx	x	x				
146	9		x	x	x	x			x		x	x		x		x		
147	5							x			x		x			x	x	
148	4	x	x		x		x											
167	4	x				x		x						x				
170	2		x											x				
181	2				x						x							
182	4				x									x	x			x
189	2										x	x						
190	7	x	x	x			x		x			x			x			
223	2	x	x															
224	5								x		x	x	x	x				
225	6							x	x		x	x			x	x		
226	7	x	x	x		x						xx	x					
227	2	x		x														
230	7	x	x					x		x	x	xx						
250	8	x	x	x		x	x	x	xx									
261	4	x	x	x	x													
264	2	x	x															
266	5								x	x	x	x		x				
268	5	x	x	x	x		x											
269	4	x	x		x		x											
272	4	x	x		x					x								
273	7	x	x	x	x		x		x		x							
274	5				x		x			x			x			x		
317	2					x		x										
323	5					x			x	x	x	x						
360	8		x		x	x	x	x	x	xx								
Totals		23	21	13	13	12	11	16	14	10	18	17	8	7	5	6	3	1
Recall		12	22	29	35	41	47	56	62	67	76	85	89	92	95	98	99	100
Precision		55	51	45	42	39	32	26	20	16	12	8	6	4	4	3	3	2

FIGURE 12 DOCUMENT OUTPUT CUT-OFF SCORE SHEET FOR INDEX LANGUAGE I.1

With Question 100, no documents are retrieved at a co-ordination level higher than four, so for this question, the various values are as follows:

Question 100

At level $c = 4$, then $x_4 = 3$, $y_4 = 1$, $X_4 = 0$, $Y_4 = 0$

At level $c = 3$, then $x_3 = 50$, $y_3 = 2$, $X_3 = 3$, $Y_3 = 1$

At level $c = 2$, then $x_2 = 21$, $y_2 = 0$, $X_2 = 53$, $Y_2 = 3$

At level $c = 1$, then $x_1 = 97$, $y_1 = 1$, $X_1 = 74$, $Y_1 = 3$

$\therefore$ For Relevant Document 1, retrieved at level 4:

$$4R_1 = 0 + (1 - 0)\left(\frac{3 + 1}{1 + 1}\right) = 0 + 2 = 2$$

For Relevant Document 2, retrieved at level 3:

$$_3R_2 = 3 + (2 - 1)\left(\frac{50 + 1}{2 + 1}\right) = 3 + 17 = 20$$

For Relevant Document 3, retrieved at level 3:

$$_3R_3 = 3 + (3 - 1)\left(\frac{50 + 1}{2 + 1}\right) = 3 + 34 = 37$$

For Relevant Document 4, retrieved at level 1:

$$_1R_4 = 74 + (4 - 3)\left(\frac{97 + 1}{1 + 1}\right) + 74 = 49 = 126$$

The normalized recall ratio was obtained by taking the sum of the recall ratios of seventeen standardized cut-off groups, and dividing by seventeen. Figure 12 shows a typical score sheet based on simulated ranking for forty-two questions with a single language while Fig. 13 presents the results for eight single term index languages.

As Salton had used the Cranfield test collection with the SMART system, it was possible to check the proposed method, and this showed that the Cranfield normalized recall ratios produced a performance ranking which closely matched that obtained with the original SMART measure. This being the case, the results of the tests on thirty-three index languages were recalculated to give the normalized recall ratios.

It must be emphasized that, for reasons which are considered at length in Chapter 5 reference 4, the use of a document output cut-off method means that recall ratios and precision ratios are interdependent. For a single system, the inverse relationship of recall and precision will always hold; however, if in a second system there is, as compared to the first, an increase in the recall ratio, then there must always be a corresponding increase in the precision ratio. Because of this, it is immaterial whether one obtains the normalized recall ratio or the normalized precision ratio.

Figure 14 shows the thirty-three index languages tested at Cranfield in a ranked order based on the normalized recall ratios. The relationship of the index languages to each other is shown in detail in figures 3, 4, and 5. Generally speaking, the Single Term index languages are found at the head of the list, the Simple Concept index languages at the bottom and the Controlled Term index languages are in the middle position.

There are a number of points of special interest in this table. The only difference between index language I.1 (rank order 3) and II.1 (rank order 33) is that the latter interfixes the single terms of the former, e.g. the single terms 'axial', 'flow', 'compressor' are combined to form the simple concept term 'axial flow compressor' (Fig. 1). However, the effect of this is to change the ranking from 3 to 33.

The only improvement on the Single Term natural language (I.1) is by the control of synonyms or the confounding of word endings. Any further extension of the classes of terms results in a drop in performance. The reverse, however, is true of the group of Simple Concept index languages, where the performance with the natural language terms is so poor that grouping of terms brings about a significant improvement. Intermediary is a third group of index

DOCUMENT OUTPUT CUT-OFF	I-1		I-2		I-3		I-5		I-6		I-7		I-8		I-9	
	R	P	R	P	R	P	R	P	R	P	R	P	R	P	R	P
1	12	55	12	57	12	57	13	60	11	52	10	48	9	43	8	36
2	22	51	23	54	23	54	19	45	21	49	21	49	19	44	16	37
3	29	45	30	47	30	48	28	44	29	46	29	46	28	44	22	34
4	35	42	36	42	37	43	32	38	35	42	33	39	32	38	27	32
5	41	39	41	39	43	40	36	34	40	38	40	38	38	36	33	31
6-7	47	32	48	32	48	32	45	30	47	32	46	31	46	31	40	27
8-10	56	26	55	26	56	26	53	25	55	26	53	25	55	26	47	22
11-15	62	20	63	20	64	20	59	19	62	19	63	20	62	20	58	18
16-20	67	16	67	16	70	17	65	15	66	16	67	16	68	16	63	15
21-30	76	12	76	12	76	12	73	12	73	12	76	12	76	12	72	11
31-50	85	8	85	8	86	8	82	8	83	8	86	8	85	8	82	8
51-75	89	6	89	6	89	6	88	6	89	6	91	6	91	6	89	6
76-100	92	4	92	4	93	4	91	4	92	4	93	4	93	4	93	4
101-125	95	4	95	4	95	4	94	4	95	4	95	4	96	4	95	4
126-150	98	3	98	3	98	3	96	3	97	3	97	3	98	3	97	3
151-175	99	3	99	3	99	3	98	3	99	3	99	3	99	3	98	3
176-200	100	2	100	2	100	2	100	2	100	2	100	2	100	2	100	2
NORMALISED RECALL	65.00		65.23		65.82		63.05		64.47		64.05		64.41		61.17	

SINGLE TERM LANGUAGES

I-1 Natural language
I-2 Synonyms
I-3 Word endings
I-5 Synonyms and quasi-synonyms
I-6 Synonyms, word endings, and quasi-synonyms
I-7 Hierarchical reduction first stage
I-8 Hierarchical reduction second stage
I-9 Hierarchical reduction third stage

FIGURE 13 RECALL AND PRECISION RATIOS AND NORMALISED RECALL FOR SINGLE TERM INDEX LANGUAGES
(R = Recall Ratio, P = Precision Ratio)

languages, based upon a controlled term vocabulary. Here the broadening of the basic terms by forming groups with related terms brings about a small loss in performance.

Numerous additional tests were made (and are reported in reference 4) to investigate various factors, such as the level of relevance of the documents, the effect of varying the search procedure, or the effect of various precision devices such as interfixing or partitioning. None of these appear in any way to affect the general results as presented in Fig. 14.

When considering the somewhat unexpected results of this project, one must, of course, bear in mind the environment in which the tests were made, but there appears to be nothing in the test design which could have so consistently influenced the results. Certainly it would be absurd to say that in all situations the most effective form of index language is one that combines simple post-co-ordination with natural language single terms which are uncontrolled except for the grouping of synonyms and terms having the same root. Yet that is what happened in this particular environment, and one can only say that it would be an unusual coincidence if a situation had been selected which was unique in the whole field of science and technology.

ORDER	NORMALISED RECALL	INDEXING LANGUAGE	
1	65.82	I-3	Single terms. Word forms
2	65.23	I-2	Single terms. Synonyms
3	65.00	I-1	Single terms. Natural Language
4	64.47	I-6	Single terms. Synonyms, word forms, quasi-synonyms
5	64.41	I-8	Single terms Hierarchy second stage
6	64.05	I-7	Single terms. Hierarchy first stage
7=	63.05	I-5	Single terms. Synonyms. Quasi-synonyms
7=	63.05	II-11	Simple concepts. Hierarchical and alphabetical selection
9	62.88	II-10	Simple concepts. Alphabetical second stage selection
10=	61.76	III-1	Controlled terms. Basic terms
10=	61.76	III-2	Controlled terms. Narrower terms
12	61.17	I-9	Single terms. Hierarchy third stage
13	60.94	IV-3	Abstracts. Natural language
14	60.82	IV-4	Abstracts. Word forms
15	60.11	III-3	Controlled terms. Broader terms
16	59.76	IV-2	Titles. Word forms
17	59.70	III-4	Controlled terms. Related terms
18	59.58	III-5	Controlled terms. Narrower and broader terms
19	59.17	III-6	Controlled terms. Narrower, broader and related terms
20	58.94	IV-1	Titles. Natural language
21	57.41	II-15	Simple concepts. Complete combination
22	57.11	II-9	Simple concepts. Alphabetical first stage selection
23	55.88	II-13	Simple concepts. Complete species and superordinate
24	55.76	II-8	Simple concepts. Hierarchical selection
25	55.41	II-12	Simple concepts. Complete species
26	55.05	II-5	Simple concepts. Selected species and superordinate
27	53.88	II-7	Simple concepts. Selected coordinate and collateral
28	53.52	II-3	Simple concepts. Selected species
29	52.47	II-14	Simple concepts. Complete collateral
30	52.05	II-4	Simple concepts. Superordinate
31	51.82	II-6	Simple concepts. Selected coordinate
32	47.41	II-2	Simple concepts. Synonyms
33	44.64	II-1	Simple concepts. Natural language

FIGURE 14 ORDER OF EFFECTIVENESS BASED ON NORMALISED RECALL FOR 33 CRANFIELD INDEX LANGUAGES

It is necessary to try to explain what has been happening in these tests so as to bring about the results as given. It must be emphasized that with the exception of Languages IV.1, IV.2, IV.3, and IV.4, in all the systems shown in Fig. 14 everything has been held constant except the index language. This is to say that we are dealing with the same documents which have all been indexed in the same way; a set of questions which have been searched in exactly the same way for each index language; a set of relevance decisions which are always the same. The only variation is the relationship of the index terms to the natural language terms of the documents.

This can be considered as a matter of specificity of the index terms. In Index Language I.1 the specificity is exactly the same as that of the single terms of the natural language. Synonyms and word endings provide, overall, a slight reduction in specificity, and also give a small improvement in performance. However, beyond this stage, the further reductions in specificity, provided by the formation of classes based on quasi-synonyms or hierarchical grouping, results in a loss in performance.

In Index Language II.1 the specificity is exactly the same as the concepts of the natural language, and these represent a higher level of specificity that the single terms. 'Constant wall temperature' is a far more specific index term than the separate single terms 'Constant', 'Wall' and 'Temperature', and, as previously noted, the result of this higher level of specificity brings about a large fall in performance. Because the Simple Concept index terms are over-specific, it is found that the broadening of the classes by any means brings about an improvement in performance. However, this improvement does not result in any Simple Concept index language reaching the level of performance of that obtained by the single terms.

The Controlled Term index languages, with ranks of 10, 11, 14, 16, 17 and 18, occupy an intermediary position. One can suggest that two conflicting factors are present. Some of the index terms were compound terms (e.g. 'Pressure welding' or 'Hydraulic equipment') and were therefore more specific than the single terms. On the other hand, a number of natural language terms were grouped to form a single term, and thereby maintain Rule T-1 of the E.J.C. Thesaurus of Engineering Terms, which warns against being too specific. It is difficult to say which of these factors was responsible for the loss in performance as compared to single terms; the only clue is that any broadening of the classes from the basic terms give a slight loss in performance, and it would therefore seem that, overall, the terms were not sufficiently specific.

This matter of specificity is related to the number of index terms (but *not* code terms) in the index language and if we plot the normalized recall ratio against the number of terms in the index language the result is shown in Fig. 15. This indicates that in the environment of this test, an index language having 2,541 terms was the most efficient.

The second factor which appears to have an important effect on performance is the level of exhaustivity of indexing. Index Languages I.1, IV.1 and IV.3 represent three levels of exhaustivity of indexing; figures are also available for Index Language I.1 when the exhaustivity is reduced by omitting terms weighted 3 and then omitting terms weighted 2 and 3. Figure 16 shows the average

number of terms of these five levels of exhaustivity and the normalized recall ratios, and the plot of figure 17 shows that the performance is optimised at a level of 33 terms; below this figure the results indicate that insufficient terms are being used, but the sixty terms of the abstracts would appear to be at too high a level of exhaustivity, since there is a large drop in performance.

Index Language	Number of terms	Normalized recall Ratio
I.9	306	61·17%
I.7	1,217	64·05%
I.3	2,541	65·82%
I.2	2,988	65·23%
I.1	3,094	65·00%
II.13	6,000*	55·88%
II.4	8,000*	52·05%
II.1	10,000*	44·64%

* *Estimated*

FIGURE 15 NORMALIZED RECALL RATIOS FOR INDEX LANGUAGES WITH VARYING NUMBERS OF INDEX TERMS

Index Language	Average No. of Terms	Normalized Recall Ratio
Titles	7	59·76%
Level 1 Single Term Natural Language	14	62·88%
Level 2 Single Term Natural Language	22	63·57%
Level 3 Single Term Natural Language	33	65·00%
Abstracts	Approx. 60	60·94%

FIGURE 16 NORMALIZED RECALL RATIOS FOR FIVE LEVELS OF EXHAUSTIVITY OF INDEXING

A clue as to how the exhaustivity of indexing and the specificity of the index language work together is provided by the comparison of Index Languages IV.1 with IV.2, and IV.3 with IV.4. With Index Language IV.1 where only the terms in the titles were used, the exhaustivity is too low. By moving to Index Language IV.2, where word forms have been confounded, the lower specificity results in an improvement of the normalized recall ratio from 58.94 per cent to 59.76 per cent. With Index Language IV.3, it has been shown that the use of all the terms in the abstracts is at too high a level of exhaustivity of indexing; when in Index Language IV4 word forms are confounded, the lower specificity now results in a loss in performance from 60.94 per cent to 60.82 per cent.

As with Cranfield I, the outcome of this test is to raise more new questions than questions it answers. It would be absurd for any organization to abandon conventional indexing and controlled index languages, whether thesauri or classification, on the basis of these test results. It would, to the author, seem equally absurd to aver that any system is operating at maximum efficiency

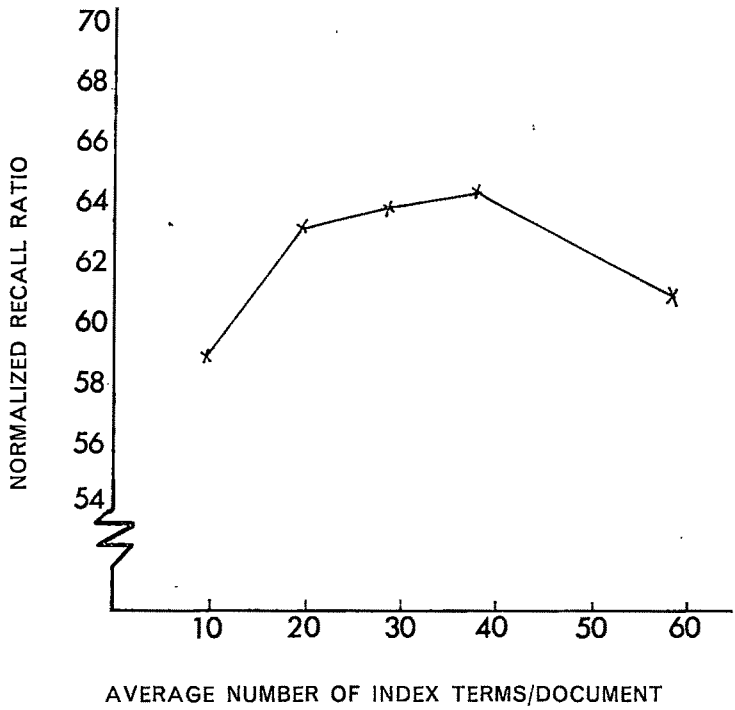

FIGURE 17 PLOT OF NORMALIZED RECALL RATIOS FOR FIVE LEVELS OF EXHAUSTIVITY OF INDEXING

unless a careful evaluation of the operational and economic characteristics of the system has been made. For this purpose, this test has shown that the use of single terms in the natural language, with true synonyms and word endings confounded, is a perfectly reasonable—and relatively simple—index language to use for comparison purposes. In practically all circumstances it would seem that such an index language is more economical than any other; it will be interesting to see whether in some cases it also turns out to be more efficient.

REFERENCES

1 CLEVERDON, C. W. Report on the first stage of an investigation into the comparative efficiency of indexing systems. Cranfield, 1960.
2 CLEVERDON, C. W. Report on the testing and analysis of an investigation into the comparative efficiency of indexing systems. Cranfield, 1962.
3 AITCHISON, J., *and* CLEVERDON, C. W. Report of a test on the Index of Metallurgical Literature of Western Reserve University. Cranfield, 1963.
4 CLEVERDON, C. W., MILLS, J., *and* KEEN, M. Factors determining the performance of indexing systems (Aslib-Cranfield Research Project). 2 vols. Cranfield, 1966.
5 SALTON, G. The evaluation of computer-based information retrieval systems. In Proceedings of the 1965 Congress of the International Federation for Documentation, pp. 125–33. Washington: Spartan Books, and London: Macmillan, 1965.

DISCUSSION

Dr Karen Needham (Cambridge Language Research Unit) said that the overall conclusion on the project seemed to depend very heavily on the normalized recall measure. She asked whether other measures were tried out and, if so, whether the same or a similar ranking of the index languages as that given by normalized recall was obtained.

Mr Cleverdon replied that the normalized recall ratio was the only *single* measure they knew which permitted performance comparison over a range of performance levels. The conventional recall-precision curves consistently appeared to show the same characteristics when one system was compared with another, but it was difficult, if not impossible, to obtain a ranked order with this method.

Mrs W. I. Veasey (B. H. Blackwell Ltd) asked whether in view of the high performance and low input cost of titles in natural language, this must be considered the best practical method of information retrieval for the ordinary librarian working with limited resources.

Mr Cleverdon replied that it could not be said categorically that this would always be the case; probably more than anything else it would depend on the subject field of the collection. However, it did appear that there might be a number of situations in which this method would be satisfactory from an operational viewpoint, and most efficient from an economic viewpoint.

Mr B. C. Vickery (Aslib) asked whether the curve of performance against exhaustivity only implied that peak performance occurred somewhere between thirty-three and sixty words per document.

Mr Cleverdon replied that the peak might, in fact, have occurred anywhere between twenty-two and sixty terms per document; the only thing that could really be said was that thirty-three terms was better than either twenty-two or sixty.

Mr T. N. Shaw (Unilever Research Laboratory) remarked that it was disturbing to see the large difference between 'single terms—natural language' and 'simple concepts—natural language'. Was there an obvious reason for this, and were the more usual recall ratio and reference/precision ratios available in a similar list to that illustrated in Fig 14, so that it would be possible to compare the behaviour of the index languages in terms more allied to practical conditions?

Mr Cleverdon replied that the testing of the Simple Concept Index Languages was carried out very rigorously. If the question term was 'convection heating', 'convective heating' or 'convection heat' was not accepted; if the question term was 'incremental normal force' 'normal incremental force' was not accepted. Basically, however, the loss in performance seemed to be due to the high specificity of the simple concepts, which the formation of classes of such terms could never overcome. He added that the full report included over seventy recall-precision curves comparing different index languages, and well over one hundred tables of performance figures.

Mr A. E. Cawkell (Consultant to Institute for Scientific Information) remarked that in his experience a small shift in the emphasis of the inquirer's interest made quite a large difference to the number of documents he considered relevant. In view of this it would seem to be difficult to attach significance to results obtained, as in the Cranfield Project, by means of a subjective judgment of the relevance of documents which were not to be used in a practical situation, although he agreed that at least some separation of the 'wheat' from the 'chaff' was possible.

Mr Cleverdon replied that the problems of relevance decisions in an artificial environment were well known; a very interesting investigation by Cuadra into this matter was now nearing completion at Systems Development Corporation. However, such experimental evidence as existed indicated that in comparing systems, the relevance decisions were less important than might have been expected. In Cranfield II the relevance judgments were on the scale of 1–4, from the most relevant documents down to those of marginal interest. There was an attempt to simulate a real life situation; it was hoped to obtain a new set of relevance decisions based on more artificial judgments and thereby obtain another set of test results. Early indications were that this was unlikely to affect significantly the comparative performance of the index languages.

Mr J. F. Blagden (British Institute of Management) asked why classification schemes had been omitted from the index languages.

Mr Cleverdon replied that classification schedules were prepared both for Single Terms and Simple Concepts and that these were used in all the hierarchical languages, as shown in figures 3 and 4. No standard classification scheme, such as UDC, was used, because the test was concerned with index language devices rather than operational index languages.

THE USE OF LINKS AND ROLES ON A PRE-CO-ORDINATION BASIS IN OPTICAL COINCIDENCE SYSTEMS

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Natural Rubber Producers Research Association

Co-ordinate Indexing Group Meeting, Thursday 12th January 1967

Links and roles have been judged to be of doubtful value, but it is agreed that the devices substantially reduce noise. These devices have been employed on a pre-co-ordination basis in an optical coincidence system, without any of the concomitant difficulties of comprehensive usage. The devices are closely related to the generic structure of the system described.

LINKS and roles have received a relatively cool reception in the field of information retrieval. Campbell[1] stated that they do not appear to be worth the extra cost and effort and Sinnett[2] has dismissed roles in very strong terms. Even with the extensive use of these devices some false recall or noise is liable to remain, and certainly no one would suggest that 100 per cent recall and relevance could be achieved by this means. The semantic connotation of noise is indicative of its unpleasantness, and its eradication, or partial elimination, is a justifiable exercise if the effort expended is in proportion to the advantages gained.

Most evaluatory studies of these devices have been based on either machine-based systems or the original uniterm card concept of physically posted numbers. Further, most of these studies have examined systems where the devices have been utilized on a comprehensive basis. Although links and roles tend to be closely associated, it is advantageous to examine their use separately.

Links

A link has been defined as a code which is capable of showing that two or more terms used to index a particular document are related to each other within the context of that document. Although relationship is displayed, the actual form of relationship is not declared.[3] The Engineers Joint Council (EJC)[4] definition is similar in context, but accentuates the means to achieve this end. Neither definition, however, emphasizes the fact that links are primarily anti-noise devices.

The basic simplicity of these devices, which can be compared with the + indicator of UDC or the colon in the Ranganathan classification, has prevented any strong criticism. Holm[5] has quoted an 11 per cent reduction of noise, without any loss of recall, when the system was used at Du Pont. Taube,[6] however, claimed that links reduce recall.

In machine or uniterm card systems cyphers are used to prevent crossover effects (Fig. 1). Without links, combinations xb and ay (which could be irrele-

vant) could occur; with links, a_1x_2 and b_1y_2 (which may be pertinent) are also prevented from being co-ordinated.

This type of system may be incorporated into optical systems in several ways. The simplest method, originally suggested by Warheit,[7] entails fracturing a document, for the purposes of indexing, into a number of sub-sections, each of which is treated as an individual unit. This system has many advantages, but cannot cope with all eventualities. In a similar way one could have duplicate sets of optical cards or employ two rows on the optical matrix and superimpose the cards at appropriate levels, or one could use punches of varying shapes. This last method has actually been employed as a weighting device.[8] All these systems, except the first, are either wasteful or complex.

It was decided, therefore, to experiment with links on a pre-co-ordination basis. This system has the advantage that its use may be restricted to areas where noise is difficult to eradicate by the document fracturing process. In this system a generic grouping is combined within an indexing term to act as a link with the terms contained within the genus. (Fig. 2.) Term 'a' is pre-co-ordinated with the genus 'B' and can, therefore, only be combined with the species B (b)'. A practical example from the NRPRA system should help to elucidate this feature. Blends form a significant proportion of the literature indexed and without linkage noise would be a serious problem. Thus several 'blends' terms have been created, each linked to a generic group:

Blends (compounding ingredients)
Blends (NR types)
Blends (NR to SR)
Blends (SR types)

Thus literature dealing with the effects of blends of antioxidants in Heveacrumb (a grade of natural rubber) would be indexed as: blends (compounding ingredients) + antioxidants + Heveacrumb. On the other hand the effects of antioxidants on blends of PA80 and Heveacrumb (both types of natural rubber) would be coded as: blends (NR types) + PA80 + Heveacrumb + antioxidants. Without this linkage both examples could be interpreted as blends of antioxidants.

Before leaving links it is necessary to examine how they may be used as an aid to vocabulary limitation. A device frequently used in the Dewey Decimal Classification is the 'other' category, which has received some criticism for its imposed selectivity. An example is shown below:

South America
* NT Argentine
NT Brazil
NT Chile
NT Other South America
NT Peru

To index material on Uruguay or Paraguay one uses the 'Other South America' category. This employs imposed selectivity, but does enable the most pertinent terms (from the point of view of the system) to be selected.

* NT=Narrower term.

Using the link principle, this concept of imposed selectivity may be exploited in other areas, where it more closely resembles Dewey's instruction to 'divide like':

Graft co-polymers of NR
NT Heveaplus MG [a].
NT Heveaplus SG [b].
NT Other graft co-polymers of NR
(co-ordinate with monomer incorporated)
'a' = a co-polymer of NR and methyl methacrylate
'b' = a co-polymer of NR and styrene

Thus a graft co-polymer of NR and acrylonitrile would be indexed as:
Other graft co-polymers of NR + acrylonitrile.

Roles

Roles have been defined as codes for synthetic relationships used to modify the meanings of major descriptors.[3] The EJC defines a role as: a number used in conjunction with, and immediately following, an index term to show how that term was used in the original document.

Roles have received considerably more attention and criticism than links, and the major study in this field, by Sinnett,[2] declared that the abolition of roles would lead to a threefold increase in the rate of indexing. Montague[9] has stated that they add 11 per cent to the total input cost, and many have expressed concern at the difficulties experienced by indexers in using these devices.[10, 11, 12, 13] These studies have, however, been based largely on the EJC or other similar systems. With the EJC system, the primary area of confusion has concerned the use of role 8, which is defined as the primary topic of consideration. This is in fact a weighting device. Apart from this and role o (bibliographic data), which may or may not be a role, the remaining indicators resemble Farradane's[14] and Perrault's[15] relating devices, but are cruder. Even with the EJC system of roles it is possible to express contextual placement, e.g.:

A(input) + B(cause) = C(effect) + D(output)

In the NRPRA system, roles have been used mainly to separate rubber products from their quasi-synonymous applications and, as with links, a system of pre-co-ordination has been employed. This is usually limited to the cryptic, bracketed expressions 'rubber' or 'non-rubber', the former being product-orientated, the latter being related to its applications. Thus 'closures (rubber)' is separated from 'closures (non-rubber)' and there is no risk of information on rubber bungs being confused with seals for metal closures. Another example relates to moulds, where, without the bracketed information products or processing equipment, it would be impossible to differentiate between moulds *for* casting latex or casting moulds *from* latex. It is apparent, therefore, that roles and links have been treated as an integral part of the generic structure of the system. This is emphasized in the terminology covering the concepts of packaging, where a generic concept is introduced to facilitate search techniques:

Packaging NT Packaging (of products)
NT Packaging (of raw rubber)
NT Packaging (rubber products)

Conclusion

Roles and links have been incorporated in a relatively painless manner. It is doubtful if they add materially to the indexing costs, except in so far as a few extra optical co-incidence cards have been required. In a recent study on noise by Blagden[16] it is estimated that 18.9 per cent of this phenomenon could have been eradicated by the use of links and 10.9 per cent by the use of roles. It is too early, however, to analyse exactly how much noise has been eradicated in the NRPRA system. It is perhaps enough to claim that progress in this direction has been investigated.

REFERENCES

1 CAMPBELL, D. J. Making your own indexing system in science and technology (classification and keyword systems). *Aslib Proceedings* vol. 15, no. 3, October 1963, p.282–303.

2 SINNETT, J. D. An evaluation of links and roles used in information retrieval. Air Force Institute of Technology, 1963. (AD 432, 198) (Thesis).

3 KOROTKIN, A. L., *and others*. Indexing aids, procedures and devices. Bethesda, General Electric Co., 1965 (AD 614, 342).

4 ENGINEERS JOINT COUNCIL. Thesaurus of engineering terms. New York, EJC, 1964.

5 HOLM, B. H. Chapter 10 of NEWMAN, S. H. Information systems compatibility. Washington, Spartan Books; London, Macmillan, 1965.

6 TAUBE, M. Notes on the use of roles and links in coordinate indexing. *American Documentation*, vol. 12, no. 2. April 1961, p. 98–100.

7 WARHEIT, I. A. A study of coordinate indexing as applied to US Atomic Energy Commission reports. *College and Research Libraries*, vol. 16, no. 3, July 1955, p. 278–84.

8 JOHNSON, A. Practical applications of feature card systems. III. *Aslib Proceedings*, vol. 15, no. 6, June 1963, p. 186–8.

9 MONTAGUE, B. A. Testing, comparison, and evaluation of recall, relevance, and cost of coordinate indexing with links and roles. *American Documentation*, vol. 16, no. 3, July 1965. p. 201–8.

10 COHEN, S. M., *and others*. An evaluation of links and roles as retrieval tools. *Journal of Chemical Documentation*, vol. 8, no. 2, May 1965. p. 118–21.

11 HINES, T. C. Chapter 11 of NEWMAN, S. H. Information systems compatibility. Washington, Spartan Books; London, Macmillan, 1965.

12 HYSLOP, M. The ASM information retrieval system: after Cranfield. *Journal of Documentation*, vol. 21, no. 1, March 1965, p. 27–42.

13 JOHANNINGSMEIER, W. F., *and* LANCASTER, F. W. Project Sharp (Ships Analysis and Retrieval Project) information storage and retrieval system: evaluation of indexing procedures and retrieval effectiveness. Washington, Dept. of the Navy, Bureau of Ships, 1964 (NAVSHIPS 250–210–3).

14 FARRADANE, J. E. L. A scientific theory of classification and indexing: further considerations. *Journal of Documentation*, vol. 8, no. 2, June 1952, p. 73–92.

15 PERRAULT, J. M. Categories and relators: a new scheme. *Review of International Documentation*, vol. 32, no. 4, p. 136–44.

16 BLAGDEN, J. F. How much noise in a role-free and link-free co-ordinate indexing system? *Journal of Documentation*, vol. 22, no. 3, September 1966, p. 203–9.

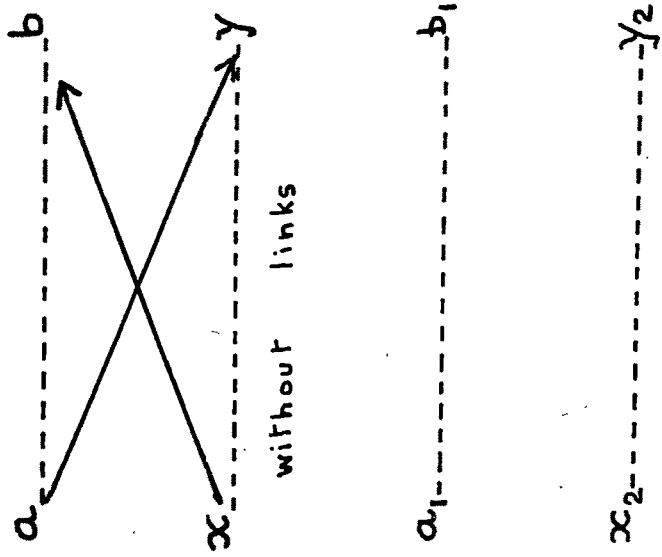


FIGURE 1

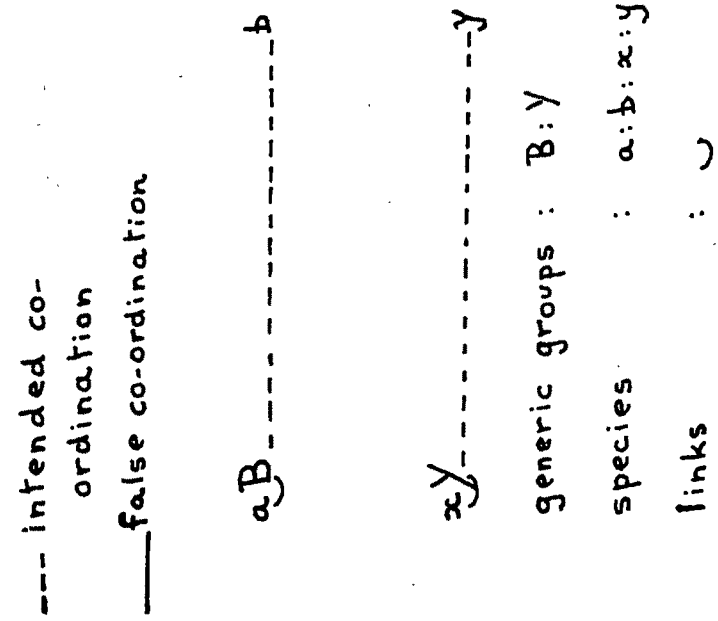


FIGURE 2

Research Note

RESEARCH AND DEVELOPMENT AT ASLIB

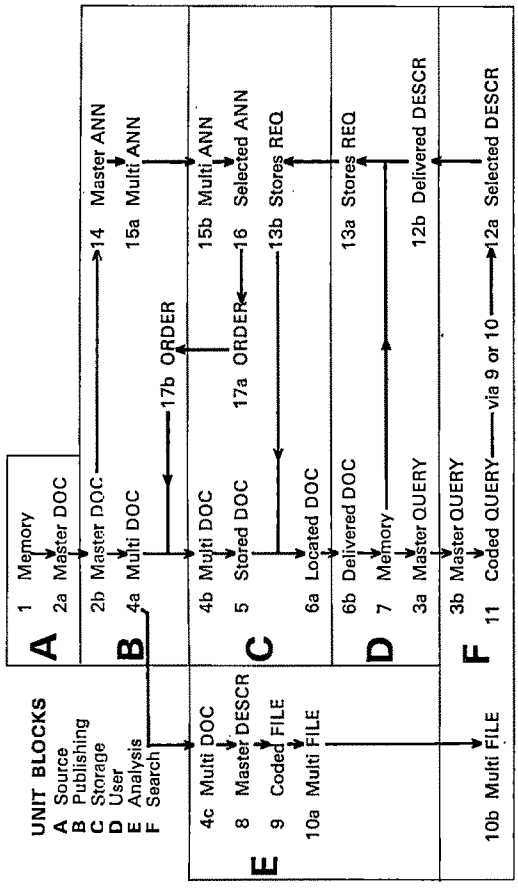
THE Research Department of Aslib now has a total staff of seventeen, and is in process of further expansion. During the last six months the department —in consultation with the Research Committee and the Office for Scientific and Technical Information—has reviewed its potential field of activities and has worked out a varied programme of projects.

The department is undertaking three types of work. First, there are projects devised by the staff, and financed by a general grant from OSTI and by special contributions from Aslib members: this is the research programme proper, in the development of which the department is guided by the Research Committee. Second, there are projects specially requested by OSTI, undertaken either directly for them or for a particular client, and financed by special grants. Third, there are private consultancies for Aslib members, undertaken for a fee. These last are, in the nature of things, confidential, so that little can be said about them here. But they are an important part of the department's activity, one that is expected to grow still further.

All these types of work contribute to the making of a balanced programme of research and development. Aslib is primarily based on special libraries and information centres, but the intermeshing of all phases of information transfer has increasingly led to the Association's involvement with other types of activity. The library is a middleman in information transfer, and is affected by problems arising at every stage of the process. Aslib is therefore interested in all aspects of communicating specialist information, and these interests are reflected in the fields of work open to research.

In preparing the departmental programme, documentation has been analysed in terms of four key functional processes—Publishing, Storage, Analysis and Search. Documents are multiplied and distributed by publishing units; they are housed and supplied on demand by library or storage units; catalogues, abstracts and indexes are prepared and distributed by analysis units; and in these guides, documents are identified by search units (who may be individual users). Information transfers take place both between and within each functional unit. The principal transfers are shown in the diagram, p. 201, showing the production, multiplication and flow of information documents (DOC), publication announcements (ANN), acquisition orders (ORDER), stores requisitions (REQ), analyses of documents (DESCR), search files of analyses (FILE), and queries (QUERY).

Research has three main aims. First, to study the actual operations of information transfer—document multiplication, storage, analysis and so on—asking, what physical and intellectual tools may be used in each, by what personnel, and how organized? What relative effectiveness has each tool and system of organization? What new tools and systems are needed and how can they be


UNIT BLOCKS
A Source
B Publishing
C Storage
D User
E Analysis
F Search
A
1 Memory
2a Master DOC
B
2b Master DOC
4a Multi DOC
14 Master ANN
15a Multi ANN
17b ORDER
C
4b Multi DOC
5 Stored DOC
6a Located DOC
15b Multi ANN
16 Selected ANN
17a ORDER
13b Stores REQ
D
6b Delivered DOC
7 Memory
3a Master QUERY
13a Stores REQ
12b Delivered DESCR
F
3b Master QUERY
11 Coded QUERY
via 9 or 10
12a Selected DESCR
E
4c Multi DOC
8 Master DESCR
9 Coded FILE
10a Multi FILE
10b Multi FILE

developed? This is the study of documentation operations, included mechanization, and the department is laying special emphasis on developments in this field.

However, as well as exploring ways of improving operations, it is necessary also to evaluate their output—asking, do the content, form and availability of publications and of analytical guides meet user needs? Are the distribution, content and services of libraries satisfactory? What new forms of publishing, storage, analysis and search output are needed, and how can they be developed? This is evaluative survey, in which Aslib has had long experience, and which is not to be neglected in the research programme.

These approaches view the documentation system as an intermeshing series of deliberately initiated actions whose individual efficiencies can be explored and improved. We may also view the system as part of the spontaneously occurring diffusion of information within society. This diffusion can be studied as a natural process, seeking to establish factors that influence it. This is not an academic exercise: a knowledge of the relative influence of various factors will indicate which detailed improvements in efficiency will have most effect on the efficiency of the system as a whole.

This, then, is the pattern of thought within which a programme of research and development is to be devised. Not all aspects of the department's activity will be fully represented by the research programme proper. In particular, studies of operations and mechanization within working systems will be more likely to occur as especially commissioned projects or private consultancies, and it is only possible at present to deal briefly with these. Within the last six months, the Department has completed a detailed study of the library system at the Atomic Energy Research Establishment, Harwell, and an analysis of potential index mechanization for a member firm. Work for the Institution of Electrical Engineers, on the production of *Physics Abstracts* by computer typesetting, has recently been concluded. Future projects commissioned by OSTI include (*a*) a study of the feasibility of mechanically handling the interlibrary loan requests that at present flow through regional bureaux and the National Central Library, and (*b*) a review of the techniques of transmitting digital and graphic data between and within libraries.

The Research Committee has reviewed and approved a research programme for 1967, which has also since been considered by the Secretary of State's (for Education and Science) Advisory Committee on Scientific and Technical Information. A brief summary of new projects planned is given below.

1. Systems study of library operations. This is a field in which the department has, as yet, had insufficient experience, and it is necessary to 'learn by doing'. The co-operation of libraries is of course essential, and so far work is in progress at the London Institute of Education and the University of Aston.
2. Development of techniques of thesaurus construction. The basic project is in three parts: (*a*) to survey existing specialist retrieval vocabularies and their methods of construction; (*b*) to construct a thesaurus of terms used in documentation, recording the techniques used and problems encountered; (*c*) to prepare for publication a manual on thesaurus con-

struction, as an aid to librarians and information officers faced with this problem.

3. Survey of the forms and uses of bibliographic records in British libraries. This project is to be undertaken in close collaboration with the British National Bibliography. The BNB plans to put its entries into machine-readable form, in Library of Congress (Project MARC) format, so that it will be possible to explore the uses of such a record. If a centrally produced, machine-readable bibliographic record is to be widely used, it must meet the needs of potential users. The project aims to discover, by sample survey, (*a*) what bibliographic records are created in British libraries (book orders, catalogue entries, recent additions, loan records, etc.); (*b*) what descriptive items (author, title, etc.) go into each type of record, and how they are represented; (*c*) the physical form of each type of record and how it is prepared.
4. Investigation, as a case study, of the techniques and costs of publishing a bibliography by computer typesetting. The project will use as a test-bed the Aslib *Index to Theses*. The aim is to carry the investigation through the systems design, programming and sample print-out stages, recording the techniques used and problems encountered, and to compare costs with those of conventional methods.
5. Assessment of the use in the UK of the literature of the social sciences relative to that of the natural sciences and technologies. The resources that need to be devoted to literature consultation and loan services should be related to the demand for these services. The existence of the NLL helps to make possible an estimate of the demand in the natural sciences and technologies. There is inadequate data for the social sciences. Using citation as a measure, the project aims to assess the relative demands in the two fields. One by-product of the project will be a bibliography of items in the social sciences. Abstracts and indexes will be searched to assess their coverage of these items.
6. Attempt to relate the national availability of natural science and technology literature to the distribution of potential users. As in other fields, there is a continuing concentration of scientific and technical literature resources in London. One factor in determining whether this meets real national needs, is to relate resources to the distribution of potential users. The project aims to survey the national distribution of (*a*) publicly available literature resources in these fields and (*b*) potential users.
7. Attempt to identify factors affecting the rate of diffusion of information in science and technology. The project is a first small exploration to open up the problem. The procedure will be (*a*) to choose a suitable bibliography in a specialised field of science and technology (*b*) to record the items cited by each paper in the bibliography (*c*) to characterise each cited item in various ways (*d*) to measure the rate of spread of knowledge about each cited item (*e*) to combine measurements for items all having the same characteristic, and (*f*) to estimate whether diffusion rates differ for differently characterised groups of items.

SELECTIONS FROM THE RECENT LITERATURE

ALL ITEMS listed may be borrowed from the Aslib Library, except those marked *, which may be consulted in the Library.

Books and Pamphlets

ALT, FRANZ L.
Information handling in the National Standard Reference Data System. Washington, U.S. National Bureau of Standards, 1966. 24 p. (NBS TN 290.) 25c.

AMERICAN LIBRARY ASSOCIATION. Library Technology Project.
Development of performance standards for binding used in libraries, phase II. Chicago, the Project, 1966. viii, 53 p. illus. (LTP Publications, no. 10.)

*AMERICAN library directory: a classified list of libraries in the United States and Canada with personnel and statistical data, plus a selected list of libraries around the world, compiled by Eleanor F. Steiner-Prag. 25th ed. New York, R. R. Bowker, 1967, x, 1444 p.

AMERICAN STANDARDS INSTITUTE Subcommittee on Periodical Title Abbreviations.
Revised and enlarged word-abbreviation list for USASI Z39.5–1963 American standard for periodical title abbreviations. Columbus, Ohio, National Clearinghouse for Periodical Title Word Abbreviations, 1966. iv, 33 p.

*BURKETT, JACK *and* PLUMB, PHILIP
How to find out in electrical engineering: a guide to sources of information arranged according to the Universal Decimal Classification. Oxford, Pergamon, 1967. xii, 234 p. illus. 21s.

*BURMAN, C. R.
How to find out in chemistry: a guide to sources of information. 2nd ed. Oxford, Pergamon, 1966. xi, 226 p. 25s.

*CANADA. National Research Council. *Library.*
Directory of Canadian scientific and technical periodicals: a classified guide to currently published titles. 3rd ed. Ottawa, the Council, 1966. iv, 49 p.

COLE, R. I., *ed.*
Data/Information availability. Washington, D.C., Thompson Book Co.; London, Academic Press, 1967. xv, 183 p. illus. (The American University Technology of Management Series, vol. 4. ed. Paul W. Howerton). Papers from Institute held by the American University, Center for Technology and Administration on Availability of Data/Information.

DE JAEGER, HERMAN
Science et information. Bruxelles, Centre National de Documentation Scientifique et Technique, 1967. 16 p.

*GREAT BRITAIN. Ministry of Technology
Technical services for industry: technical information and other services available from Government departments and associated organizations. London, the Ministry, 1967. 195 p.

HARVEY, JOHN, *ed.*
Data processing in public and university libraries. Washington, D.C., Spartan Books; London, Macmillan, 1966. ix, 150 p. diagrs. (Drexel Information Science Series, vol. 3) 54s.
Combined Proceedings of the Drexel Conference on Data Processing in University Libraries, June 24–6, 1965 *and* Drexel Conference on Data Processing in Pubic Libraries, October 22–3, 1965 at Philadelphia, Pa.

HENDRICKS, D. D.
Comparative costs of book processing in a processing center and in five individual libraries. PhD thesis, University of Illinois. Ann Arbor, Mich., University Microfilms, 1966. $3.65. (Microfilm).

HOUGHTON, BERNARD, *ed.*
Information work today: papers presented at a symposium for information workers held at Liverpool School of Librarianship in September, 1966. London, Clive Bingley, 1967. 119 p.

INTERNATIONAL CONFERENCE ON CATALOGUING PRINCIPLES, Paris, October, 1961.
Statement of principles adopted . . . Annotated edition with commentary and examples by A. H. Chaplin, assisted by Dorothy Anderson. Prov. ed. Sevenoaks, Kent, IFLA, 1966. 66 p. 20s.

INTERNATIONAL CONFERENCE ON CLASSIFICATION AND CODING, 1st, Ft. Lauderdale, Florida, November 10–11, 1966
[Abstracts of papers.] Florida, Brisch, Birn and Partners Ltd., Inc., 1966. var. paging.

INTERNATIONAL CONFERENCE ON EDUCATION FOR SCIENTIFIC INFORMATION WORK, Queen Elizabeth College, London, 3rd–7th April 1967
Papers accepted for discussion. London, the Conference, 1967. var. paging. diagrs. Preprints only

KENT, ALLEN
Textbook on mechanized information retrieval. 2nd ed. New York, Interscience, 1966. xx, 371 p. illus., diagrs. (Library Science and Documentation, vol. III, general editor, Jesse H. Shera.) 60s.

KING, D. W., *and* WIEDERKEHR, R. R. V.
Cost models for determining optimum document reproduction policies at CFSTI. Denver, Col., Westat Research Analysis, Inc., 1966. [19] p. diagrs. $1.

LIBRARY ASSOCIATION. REFERENCE, SPECIAL AND INFORMATION SECTION, 14th annual conference, Cardiff, April 1st–4th, 1966.
Proceedings, edited by Paul Kirwan. London, the Section, 1966. 48 p. 12*s* (9*s* mem.).

MEADOW, CHARLES T.
The analysis of information systems: a programmer's introduction to information retrieval. New York, John Wiley, 1967. xv, 301 p. tables, diagrs. $11.50.

MUSIC LIBRARY ASSOCIATION
Manual of music librarianship. Ann Arbor, Michigan, the Association, 1966. ix, 140 p.

NATIONAL COLLOQUIUM ON INFORMATION RETRIEVAL, 3rd, Philadelphia, Pa., May 12–13, 1966
Information retrieval, a critical view: [proceedings] edited by George Schecter. Washington, D.C., Thompson; London, Academic Press, 1967. xiv, 282 p. tables, diagrs. $11.

OLLÉ, JAMES G.
Library history: an examination guidebook. London, Clive Bingley, 1967. 67 p. (Examination Guide Series.) 15*s*.

*ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT (OECD). Development Centre
Aligned descriptor list for economic and social development. Paris, the Centre, 1966. 295 p. Working document.

SPECIAL LIBRARIES ASSOCIATION. Texas Chapter
Texas looks at science information: an appraisal of resources and services. Proceedings of symposium, edited by Julie Hallmark Nott. Dallas, the Chapter, 1966. vi, 527 p.

*STANDARD PERIODICAL DIRECTORY, 1967. 2nd ed. New York, Oxbridge Publishing Co., 1966. 1019 p. $25.

STEBBINS, KATHLEEN B.
Personnel administration in libraries. 2nd ed., rev. and largely rewritten by Foster E. Mohrhardt. New York, Scarecrow Press, 1966. 373 p.

SWANSON, DON R.
Requirements study for future catalogs: progress report no. 1. Chicago, University Graduate Library School, 1966. var. paging.

SYMPOSIUM ON MANAGEMENT INFORMATION SYSTEMS AND THE INFORMATION SPECIALIST, Purdue University, Indiana, July 12–13, 1965.
Proceedings, edited by John M. Houkes. Lafayette, Indiana, Krannert Graduate School of Industrial Administration and University Libraries, 1966. 138 p. diagrs. $3.

UNESCO
Declaration of the principles of international cultural co-operation. Paris, Unesco, 1967. 11 p.

UNITED STATES. Federal Council for Science and Technology. *Committee on Scientific and Technical Information*
Standard for descriptive cataloging of government scientific and technical reports. Washington, D.C., the Committee, 1966. iii, 50 p. (Rev. no.1.) (AD 641 092.) $1.

WESTHUIS, JUDITH LOVEYS *and* DEYOUNG, JULIA M.
Cataloging manual for nonbook materials in learning centers and school libraries. Ann Arbor, Michigan Association of School Librarians, 1966. iii, 36 p. diagrs. $2.

WOOD, D. N., *and* HAMILTON, D. R. L.
The information requirements of mechanical engineers: report of a recent survey. London, Library Association, 1967. 35 p. tables. 9*s*.

Articles and Papers

ANSARI, M. I., *and* NOMANI, M. S.
Filing scheme for pamphlets in a library. *Iaslic Bulletin*, vol.11, no.4, December 1966, p.221–7.

BARNES, MELVYN
Recruitment to public librarianship. *Library World*, vol.68, no.802, April 1967, p.278–80. Appendix covers course given by Manchester Public Libraries on 'Careers in Librarianship'.

BARNETT, JOSEPH I.
How to install a management information and control system. Copied from *Systems and Procedures Journal*, vol.17, no.5, September-October 1966, p.10–15.

BATEMAN, R. B.
Libraries and schools. *Library Association Record*, vol.69, no.4, April 1967, p.116–9.

BRAUN, R. R.
The role of scientific meetings in the diffusion of scientific information. *International Associations*, vol.19, no.4, April 1967, p.277–83.

CATALOGUING by computer
An Leabharlann, vol.25, no.1, March 1967, p.26–9. Reprinted from *I.C.T. Data Processing Journal*, no.28, 1966.

CHEESMAN, B.
University of Liverpool finding list of scientific, medical and technical periodicals. *Program*, no.5, April 1967, p.1–4.

CHOROSZUSZYNA, JADWIGA
Dwudziestolecie Unesco projekty zmian w strukturze organizacyjnej i programie dzialanosci w zakresie dokumentacji i informacji. [Twenty years of Unesco's activity, projects of modifications in the organizational structure and in the programme of activity in the fields of documentation and information.] *Aktualne Problemy Informacji i Dokumentacji,* vol.11, no.6, 1966, p.1–8.

CLARKE, ALICE
Nottingham University library: survey on the provision of books for undergraduates. *Research in Librarianship,* vol.1, no.5, February 1967, p.125–130.

COTTON, NORMAN L.
How we prepared our parts catalog. Copied from *The Office,* November 1966, p.245–7.

DANTON, J. PERIAM
The subject specialist in national and university libraries, with special reference to book selection. *Libri,* vol.17, no.1, 1967, p.42–58. Revision of paper originally presented at 32nd Session of IFLA General Council, September 1966.

EASTEAL, E. R.
Concepts of information research in special libraries. Copied from *Marconi Review,* vol.29, no.163, 1966, p.153–8.

FRANK, JOAN
The German library pattern: a British view. *Library Association Record,* vol.69, no.4, April 1967, p.116–9.

GARVIN, PAUL L.
Machine translation—fact or fancy? *Datamation,* vol.13, no.4, April 1967, p.29–31.

GINZBERG, ELI
What is manpower? *Wilson Library Bulletin,* vol.41, no.8, April 1967, p.794–9.

GRÖNBERG, LENNART
University libraries—national libraries: aspects of the problems in Scandinavia, especially in Sweden. *Libri,* vol.17, no.1, 1967, p.59–62.

GROTZINGER, LAUREL
The University of Illinois Library School, 1893–1942. *Journal of Library History,* vol.2, no.2, April 1967, p.129–41.

HAMADA, SHIGENORI
Dzialalnosc w zakresie informacji naukowo-technicznej w Japonii. [Scientific and technical information in Japan.] *Aktualne Problemy Informacji i Dokumentacji,* vol.12, no.1, 1967, p.1–3.

HARRIS, MICHAEL H.
Library history: a critical essay on the in-print literature. *Journal of Library History,* vol.2, no.2, April 1967, p.117–125. Includes short bibliography.

HUMPHREYS, KENNETH
The subject specialist in national and university libraries. *Libri,* vol.17, no.1, 1967, p.29–41. Paper presented at 32nd Session of IFLA General Council, September 1966.

INDWAR, R. P.
Improvement in status, pay-scales and other working conditions of librarians and other library staff of special libraries. *Iasli Bulletin,* vol.11, no.4, December 1966, p.228–36.

[INSTITUTION OF CHEMICAL ENGINEERS]
The chemical engineer and the mastery of information: a meeting held at the Geological Society, 24 May 1966. Copied from *The Chemical Engineer,* vol.205, January-February 1967, p.CE22–30.
SNEL, R.
Information retrieval and decision taking.
BATTEN, W. E.
The information system as an essential tool for the engineer.

KABDEBO, THOMAS
Reading and the university student Part II a survey based on bilingual questionnaires. *Research in Librarianship,* vol.1, no.5, February 1967, p.120–4.

KASBOHN, ADELHEID
Der Problem der wenig benutzten Literatur in wissenschaftlichen Bibliotheken. [The problem of the little-used literature in scientific libraries.] *Zentralblatt für Bibliothekswesen,* vol.81, no.3, March 1967, p.131–49.

KENT, A., *and other:*
Relevance predictability in information retrieval systems. *Methods of Information in Medicine,* vol.6, no.2, April 1967, p.45–51.

KLEINSCHROD, WALTER A.
The new ways of cutting copier costs. Copied from *Administrative Management,* vol.27, no.9, September 1966, p.72–9, 82, 86, 88, 90.

KRAINES, FREIDA
Some practical advice on indexing. Copied from *The Office,* December 1966, p.22, 24, 26, 28, 33, 34, 150–3.

LAZAR, PETER
Rola informacji w zarzadzaniu. [The role of information in management.] *Aktualne Problemy Informacji i Dokumentacji,* vol.11, no.6, 1966, p.9–13.

LESKI, KAZIMIERZ
Zagadnienie deskryptorow i tezaurusow w swietle wymiany informacji i przetwarzania materialow. [Descriptors and thesauri seen in terms of the exchange of information and the processing of materials.] *Aktualne Problemy Informacji i Dokumentacji,* vol.11, no.6, 1966, p.14–18.

LINTON, W. D., *and* MCELHINNEY, M. B.
74487 Queens Belfast: telex at Queens University Science Library. *An Leabharlann,* vol.25, no.1, March 1967, p.3–8.

MARGOLIS, J.
Citation indexing and evaluation of scientific papers. *Science,* vol.155, no.3767, 10th March 1967, p.1213–9.

MINCKLER, T. M., *and others*
HUMARIS: an automated medical data management system. *Methods of Information in Medicine* vol.6, no.2, April 1967, p.65–9.

MITTAL, R. L.
Education for librarianship during fourth five-year plan in India. *Libri* vol.17, no.1, 1967, p.21–8.

MULLER-SAALA, HEINZ
Miracode, ein elektronisches Verfahren zur Auswertung von Mikrofilmen. [Miracode, an electronic microfilm evaluation method.] *Reprographie* vol.7, no.2, 1967, p.25–6.

OHMAN, E.
UDK-systemets framtid: nagra reflektioner efter fem ar vid FID:s klassifikationsavdelning. [The future of UDC: some observations after five years at the FID Classification Department.] *Tidskrift for Dokumentation* vol.22, no.6, 1966, p81.–4.

REID-SMITH, EDWARD R.
Research for librarians: some sources of information. *Research in Librarianship* vol.1, no.5, February 1967, p.131–4.

REPORT on Conference on library manpower: needs and utilization, Washington, D.C., March 9–11, 1967. *Wilson Library Bulletin* vol.41, no.8, April 1967, p.820–3.

RICHMOND, HAZEL
Recruitment in action. *Wilson Library Bulletin* vol.41, no.8, April 1967, p.824–7.

ROBERTS, S.
The relevance of rare book collections to a university library. *Library Association Record* vol.69, no.4, April 1967, p.109–13.

SAMPATH, PUSHPA, *and* MURTHY, V. S.
Technical writing in India. Copied from *IEEE Transactions on Engineering Writing and Speech* vol.EWS–9, no.2, December 1966, p.30–32.

SCHULTZ, LOUISE
Scientific and technical information activities: national studies and machine systems. Copied from *IEEE Transactions on Engineering Writing and Speech* vol.EWS–9, no.2, December 1966, p.36–9.

TELL, BJORN
Bibliotek och dokumentationscentraler inför teknologiska förändringen. [The impact of technological change in libraries and documentation centres.] *Tidskrift for Dokumentation* vol.22, no.6, 1966, p.85–9.

TESITEL, ALOIS
Bibliotheksbau in dem USA—einige Ergebnisse einer Studienreise. [Library building in the USA—some results of a library study tour.] *Zentralblatt für Bibliothekswesen* vol.81, no.3, March 1967, p.149–67.

UYTTERSCHAUT, LOUIS
Pour une politique de documentation dans le domaine des sciences sociales. [On a documentation policy in the field of the social sciences.] Copied from *Synopsis* vol.8, no.104, December 1966, p.15–24.

VAN RIPER, PAUL P.
The dimensions of manpower: problems and policies. *Wilson Library Bulletin* vol.41, no.8, April 1967, p.800–9.

VENKATACHARI, P. N.
Problematical Indian government publications: a cataloguer's survey. *Iaslic Bulletin.* vol.11, no. 4, December 1966, p.241–5.

VERNER, MATHILDA
Librarianship in Western Germany. *Journal of Library History* vol.2, no.2, April 1967, p.144–51.

WHATLEY, H. A.
A study tour to socialist countries. *Library World* vol.68, no.802, April 1967, p.273–4. Brief resumé of A.A.L. Study Tour to Czechoslovakia and U.S.S.R.

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TECHNICAL AND COMMERCIAL translations from English into Russian. Mrs O. Linsley, 31 Parke Road, Barnes, London SW13. Tel.: 01-748 8822.

TRANSLATIONS FROM TURKISH. All subjects. F. P. Scott, 4 Uphill Grove, Mill Hill, London NW7.

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Aslib's Research Department has two vacancies for men or women with experience in library or information work and an appreciation of the systems approach to this work. Immediate tasks will be to survey the nature and use of bibliographic records, the optimum size of library stock, and the construction of thesauri for indexing. There may be opportunities to assist in consultancy work. Starting salary in the range £1,200–£1,400 p.a. Write, giving full details of qualifications and experience, to the Director, Aslib, 3 Belgrave Square, London SW1.

ASLIB. *Library Equipment Specialist.*
Aslib requires a man or woman with some knowledge of modern library and data-processing equipment to demonstrate its uses to inquirers and trainees. The successful applicant will be expected to become an expert on all aspects of machinery and equipment for library work (such as the IBM 870 and tape-typewriters) and to assist with Aslib's consultancy service. Starting salary in the range £1,400–£1,600 p.a. Write, with particulars of qualifications and experience, to the Director, Aslib, 3 Belgrave Square, London SW1.

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The duties cover the selection and dissemination of news items and information, from all sources, which bear on the Company's affairs.

An older woman with a broad interest in current affairs and relevant experience would be preferred but younger women will be considered.

Candidates should write giving full personal particulars and details of experience to the

Director of Personnel
Courtaulds Limited
P.O. Box No. 1 AL, 9 Henrietta Place, London, W.1
quoting reference number E.43

The Royal Statistical Society invites applications for the post of Librarian. Candidates, who should be Chartered Librarians, will be expected to have had considerable experience of library work, preferably in the statistical or analogous fields.

The Library is situated near Manchester Square. Other staff are employed. The starting salary will be not less than £1,250 but account will be taken of relevant experience.

Applications should be sent to:

The Secretary
The Royal Statistical Society
21 Bentinck Street
London, W.1

by 30th June

SPECIAL LIBRARIAN

The rapidly growing Library of the CENTRAL ELECTRICITY RESEARCH LABORATORIES, Leatherhead, Surrey, covers a wide range of subjects including chemistry and biology, physics, metallurgy, electrical, mechanical and civil engineering. Some 450 technical and scientific journals are currently taken.

The Librarian will be responsible for maintaining close liaison with National and other Special Libraries. In addition, he will be responsible for the efficient administration of the Library, the ordering, cataloguing, and classification using U.D.C. Applicants must be professional librarians with experience in a scientific or technical library.

Salary within the range £1,410-£1,665 p.a.

Applications stating full relevant details and present salary to N. Berryman, Personnel Officer (Headquarters), Central Electricity Generating Board, Sudbury House, 15 Newgate Street, London, E.C.1., as soon as possible. Quote Ref. A.P. CERL/LIB.

THE UNITED STEEL COMPANIES LIMITED
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ASSISTANT LIBRARIAN

An Assistant Librarian is required for a large industrial and scientific library. Applicants should have experience of indexing and retrieving technical information. In addition to handling readers' inquiries, literature searches and general reference work, the duties would include cataloguing, classification and assisting with co-ordinate indexing. Considerable scope for personal initiative in developing present services. Excellent working conditions; five-day week; pension scheme; pleasant surroundings; private coach connection from Sheffield to Laboratories; modern dining facilities. Salary according to qualifications and experience but equivalent to AP III range.

Applications should be addressed to:

The Deputy Director of Research, The United Steel Companies Limited
Research and Development Department
Swinden Laboratories, Moorgate, Rotherham, Yorks

TRANSLATOR

There is a vacancy for a translator on the staff of ICI Nobel Division's comprehensive technical library at Stevenston. This library, with its associated technical information service, is part of the Research Department and provides essential help to all in the Division who need specialised information.

The successful candidate, man or woman, will deal with foreign literature and correspondence on explosives technology, cellulose chemistry, organo-silicon compounds, and general chemistry.

Necessary qualifications for the post include a good scientific background, with preferably a degree in science, and the ability to read French and German technical literature fluently. Previous experience, with knowledge of other languages particularly Russian, would be advantageous.

The starting salary offered will depend upon age, experience, and qualifications. Conditions of employment are attractive. The Company operates a five-day week, a contributory staff pension fund and a profit-sharing scheme. Should the successful candidate be a married man, there will be assistance with removal expenses.

For an application form please write to:

The Personnel Manager,
Imperial Chemical Industries Limited,
Nobel Division,
Nobel House, Stevenston,
Ayrshire.

TECHNICAL LIBRARIAN

Lilly Research Laboratories Limited will open a new Research Centre at Windlesham, Surrey, in August.

Applications are invited from experienced technical librarians who possess the ability to organise a new library, control routine administration and prepare technical abstracts.

As the Research Centre is primarily engaged in the chemical, biological and medical field of studies, the candidate should have a scientific training, preferably to degree standard.

The Company operates a generous non-contributory pension scheme and other fringe benefits and would be prepared to offer an attractive salary to the right person.

Applications, with brief details of previous experience, should be sent to the:

Personnel Manager,
Lilly Research Laboratories Limited,
Bromborough Port, Cheshire.

LIBRARY APPOINTMENT : UNILEVER RESEARCH

Over the next few years we shall be critically examining and streamlining Library procedures in our Research Laboratory at Port Sunlight with two objectives in mind:

(1) to enable the Library to continue to meet the ever-increasing demands made on it, and

(2) to plan and prepare for a second Library, situated in a new laboratory shortly to be built at Port Sunlight.

We wish to appoint a well-educated person to help to devise improved procedures, and able to assume responsibility for seeing that they are effectively implemented. He or she will also contribute ideas for the equipping of the new Library accommodation. Frequent contact with all levels of the staff of the Laboratory will be a feature of the job.

The person appointed will probably have worked in a responsible position in a special library, or have had extensive experience in another sphere of the problems of handling systematically a wide variety of documents. Specialist subject knowledge and formal qualifications will be less important than intelligence, initiative, and the ability to organise.

If you are interested in a post offering the opportunity to shape the environment in which you will be working, we invite you to write for an application form to:

The Staff Officer (Ref. S58/U),
Unilever Research Laboratory,
Port Sunlight,
Cheshire.

TECHNICAL INFORMATION OFFICER

BRITISH PETROLEUM has a vacancy for a TECHNICAL INFORMATION OFFICER at its HEAD OFFICE in London.

Duties include evaluating and classifying articles for inclusion in the Group's Technical Literature Index; preparing bibliographies, surveys, reviews, etc., from technical literature and supplying information to Company staff.

Candidates, aged 22-35, should be Science graduates (Chemistry preferred), and have a working knowledge of French. Membership of the Institute of Information Scientists, or experience as a Technical Information Officer is essential.

Please apply, giving brief details of qualifications and experience and quoting ref.: F.4789/7AP to: D. S. M. Scott, Recruitment and Placement Branch, The British Petroleum Company Limited, Britannic House, Moor Lane, London, E.C.2.

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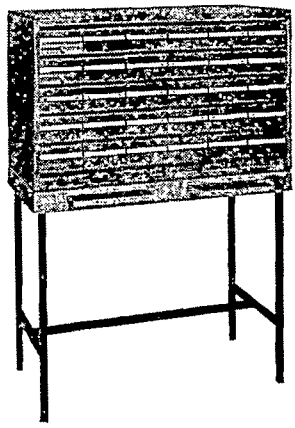

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G. WOLEDGE

Microforms in Information Retrieval and Communication Systems
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Aslib Proc. vol.19 no.7 pp.211-248 London, July 1967

CALCUTTA UNIVERSITY CENTRAL LIBRARY

ASLIB PROCEEDINGS

incorporating Aslib Information

Volume 19 July 1967 Number 7

ASLIB CALENDAR 1967

September

WED.13.	Transport Group visit to the Cement and Concrete Association Research Station, Wexham Springs, Slough.
TUE.19 *or* WED.20.	Evening meeting.
TUE.26 – FRI.29.	Junior Introductory Course to Special Library and Information Work, Glasgow.

October

WED.4.	Technical Translation Group, 4 p.m. 'Teaching technical translation.'
MON.9. – THU.12.	41st Annual Conference at Harrogate.
MON.16–THU.19.	Junior Introductory Course to Special Library and Information Work, London.
THU.26.	Evening meeting.

November

THU.2.	Transport Group one-day conference on transport statistics at the Society of Motor Manufacturers and Traders Ltd.
WED.8.	Joint evening meeting with BSI Standards Associates' Section. 'Standards information—what you need and where to get it,' by R. L. Collison.
WED.22.	Evening meeting.
THU.23.	Technical Translation Group, 5 p.m. 'Technical interpreting as an interesting sideline.'

December

WED.20.	Aslib Christmas Party.

Aslib—BSI Standards Associates' Section

On Wednesday 8th November 1967 there will be a late evening meeting arranged jointly by Aslib and the British Standards Institution Standards Associates' Section, when Mr R. L. Collison, Librarian of the BBC, will speak on 'Standards information—what you need and where to get it'. Further details will be available in a later issue of *Aslib Proceedings* together with application forms for attendance.

Junior Introductory Course

In order to enable members outside London to attend Aslib courses more easily it is hoped in future to arrange for courses to be held in the provinces as well as in London. The first course to be treated in this way is the Junior Introductory Course to Special Library and Information Work, which will be held in Glasgow from 26th to 29th September and in London from 16th to 19th October.

This course is intended for students who have recently taken up junior posts in special libraries and information departments, and is designed to provide those who are occupied mainly in routine duties with an understanding of their work and its place in the organization, which will help them improve their efficiency and give them an incentive to progress to more exacting tasks. It will include lectures on various aspects of library and information work, visits to libraries and information departments, and a number of discussion sessions. The fee for the course will be eight guineas.

Programmes for both courses are enclosed in this issue and applications to attend should be made on the forms contained in them. As these courses are usually heavily overbooked, intending students are advised to book early. Provisional bookings will be accepted by telephone or Telex. Students holding a university degree or in a senior position will not be accepted for this course and are advised to wait for the next Senior Introductory Course.

Anglo-Czechoslovakian Information Symposium

The second Anglo-Czechoslovakian Information Symposium was held at The Ciba Foundation in London from 20th to 27th May. This form of bi-national exchange sponsored by The Ciba Foundation, OSTI and Aslib is a continuation of a similar meeting* held at the House of Scientific Workers of the Czechoslovakian Academy of Sciences at Liblice near Prague in May of last year.

On this occasion the Czechoslovakian delegation (thirteen participants) consisted mainly of members of the two Academies of Sciences and the Centre for Scientific, Technical and Economic Information in Prague, which has a role similar to that of OSTI in the United Kingdom. The United Kingdom group (sixteen participants) included members of Aslib staff, OSTI, and a

*Proceedings of Small meeting of Czechoslovak and British information specialists, Liblice, May 16–21, 1966. Prague, Centre for Scientific, Technical and Economic Information, 1967.

number of individuals involved in classification and research and representative of work in operating and proposed mechanized systems.

In the plenary sessions the papers provided a stocktaking of the present position and trends in Czechoslovakia and the United Kingdom, mainly in three areas:

(*a*) basic intellectual problems in classification and indexing;
(*b*) the organization of mechanized services, their evaluation, and the problems of centralization of information units;
(*c*) appraisal of working systems in large national libraries, university libraries and public libraries and industry.

In spite of the differences in the two national structures it was clear that there were many similar problems and our Czechoslovakian guests were able to broaden their understanding of our institutions and methods by first-hand observation.

It is hoped that the papers presented will be made available in due course in some near-print form.

First International Conference on Mechanized Information Storage and Retrieval Systems

An international conference on mechanized information storage and retrieval systems will be held at the College of Aeronautics, Cranfield, from Tuesday 29th to Thursday 31st August 1967. It is sponsored jointly by the College and the journal *Information Storage and Retrieval.*

The theme of the conference will be the future role of computers in information storage and retrieval and speakers will include people from organizations which already have considerable experience of operating mechanized systems, and those whose research is reaching the stage where it is possible to consider the practicality and the effects of applying new techniques to be used with the next generation of computers. There will also be a session for short papers by delegates. The conference fee will be £12.

Further information may be obtained from Mr C. W. Cleverdon, College of Aeronautics, Cranfield, Bedford.

Newcastle Seminar on the Organization and Handling of Bibliographical Records by Computer

A seminar on the organization and handling of bibliographical records by computer is being held at Newcastle University from 18th to 20th July. It is sponsored jointly by the Computing Laboratory and the University Library. Attendance, totalling about fifty, is by invitation, and is confined almost exclusively to individuals working in the field or with special knowledge of some aspect. Papers to be given cover such topics as the structure of libraries, the differences between libraries in their operations and records, national and central cataloguing, the problems and possibilities of using computers for rare book catalogues, and the problems of large random-access files for retrieval

purposes. The work done at Newcastle and elsewhere is being used as a framework for discussion. It is hoped that the proceedings of the seminar will be published.

Review

ELLEN M. CODLIN. *Handlist of basic reference material for librarians and information officers in electrical and electronic engineering.* 4th ed. Aslib Electronics Group, January 1967. Price 15*s* (10*s* to members).

This fourth edition has been revised, enlarged (now 386 entries) and provided with author and subject indexes.

The *Handlist* covers 'published reference work, of which the contents are assumed to be basic and unchangeable, or regularly revised and brought up to date, or of a general nature useful in all or many of the subjects needed.'

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1967–1968

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A. P. J. Edwards

Classification for Information Retrieval

An intensive course on classification for information retrieval will be held at the Liverpool College of Commerce on Tuesday 19th and Wednesday 20th September. It is intended to provide an introduction to the principles of modern classification techniques, with particular reference to the needs of industry. Subjects will include the Universal Decimal Classification and faceted classification, including their practical application, co-ordinate indexing, and mechanical indexing.

The fee will be £2. Further information should be obtained from Mr K. G. B. Bakewell, School of Librarianship, College of Commerce, Tithebarn Street, Liverpool 2.

Staff retirement: Mrs S. Sauvée

As most members already know, Mrs Sauvée (formerly Miss D. M. Bremner) retired from her full-time staff appointment with Aslib at the end of June after nearly seventeen years' service with the Association. She joined the staff in December 1950, after successful careers in business and with the British Food Manufacturing Industries Research Association, at a time when Aslib needed to build up its membership and expand its services, especially in the industrial sphere. Miss Bremner entered upon her particular task of mounting a campaign to attract new members with an enthusiasm which—perhaps surprisingly and certainly to Aslib's benefit—endured throughout her years of sustained endeavour. It is in no small measure due to her personal efforts that the membership has grown from one thousand to nearly three thousand in the time.

Later Miss Bremner—who married Mr R. L. Sauvée of Sovex Ltd in 1961—took on additional responsibilities for liaison with the membership as a whole and with the Aslib Groups in particular. She agreed to remain with Aslib on a yearly basis on reaching her normal retirement date, and Aslib is very glad indeed to have had the benefit of her continued services; now, however, the next decisive stage in Aslib's growth necessitates some further reorganization. A familiar figure at Aslib meetings everywhere, Mrs Sauvée will be sorely missed, and the membership, Council and the Director and his staff join in wishing her a long and happy retirement; that it will also be energetically and enthusiastically enjoyed there can be scarcely any doubt.

COPYRIGHT AND LIBRARY PHOTOCOPYING: THE PRACTICAL PROBLEMS

G. WOLEDGE

formerly Librarian, The British Library of Political and Economic Science

Evening Meeting, London, Wednesday 23rd November 1966

I SET out comprehensively the provisions of the British law of copyright as they affect libraries in an earlier paper (*Journal of Documentation*, vol. 14, no. 2, pp. 45–50), which presents what I believe to be still an accurate and reasonably complete picture of the situation, but which is too comprehensive to be easily used as a quick guide to the solution of current working problems. The present paper, based on an address to an Aslib Winter Meeting and on the very useful discussion which followed it, concentrates on the kinds of case that trouble the librarian most frequently, and approaches them practically rather than theoretically. For further detail, and for discussion of topics not treated here, the reader may refer to the earlier paper.

Periodical articles: single copies

I will consider first the making of single copies of periodical articles. What are the circumstances in which it is not an infringement of copyright for a library to make for a reader a single photocopy of a copyright periodical article without the permission of the copyright owner?

Firstly, under section 6 of the Copyright Act 1956, such copying is not an infringement if it is fair dealing for purposes of private study or of research.

The Society of Authors and the Publishers Association, in their joint statement on *Photocopying and the law*, say that such fair dealing must be exercised by the individual for himself, and does not cover copying by a library for a reader. I give in the appendix below reasons for believing that this view is based on a misapprehension, and that the exemption applies to a copy made for a reader by a library in exactly the same way as it does to a copy he makes for himself.

Something should be said of the justifying purposes. 'Study' must be 'private'; this presumably excludes study in class, but it is hard to think of any other kind of study that is not private. 'Research' is not restricted in this way, and research for a firm for industrial or commercial purposes can accordingly be a ground of exemption.

What, in this connection, is fair? The 'general licence' of the Society of Authors and the Publishers Association (see below), which is so helpful in the case of books, will not often be useful for periodical articles, since it is limited to the copying of not more than 10 per cent of an item, and it will usually be a copy of the complete article that will be required. 'Fair,' in this connection, has no technical meaning; the librarian must ask himself whether the desired copying is fair in the ordinary sense of the word. My own view, which seems

to be supported by decisions of the Courts, is (as stated in my previous paper) that in view of the fact that the purpose of copyright is to ensure a profit to authors and publishers in consideration of their putting works into circulation, it would be unfair for a library to make a photocopy if a reasonable alternative is the purchase of a new copy of the original, and that it would generally be fair in any other case. So far as concerns periodical articles, since complete photocopies can readily be obtained under the provisions of section 7 of the Act (see below) it could hardly be held to be unfair to provide them in this way.

Though it is not a legal requirement, before supplying a copy justified on these grounds a librarian would do well to obtain from the recipient a signed declaration that it is required for purposes of research or private study (such as is necessary if he wishes to claim the alternative justification given by section 7 of the Act).

The foregoing applies to the copyright of the text, but there is also a copyright in typographical arrangement, which is the property of the publisher. This was newly created by the 1956 Act, and was said to be necessary because some publishers had produced editions of non-copyright texts by reproducing photographically, relatively cheaply, the expensive typography of other publishers. The photocopying of typography is exempt from infringement if it is done in almost any of the normal circumstances by one of the libraries privileged under section 7; but this exemption does not extend to libraries of firms, nor to individuals. However, in view of the evil which this provision was designed to prevent, photocopying of typography in any normal circumstances is no doubt exempt from infringement on another ground, as not being substantial.

For libraries of most kinds, but *not* for those of industrial and commercial concerns, another ground of exemption from infringement is given by section 7 of the Act, and the regulations made under it. The procedure laid down involves roughly the following:

1 The recipient must sign a declaration that the copy is required for purposes of research and private study.

2 Only one copy can be supplied to any individual.

3 Only one article from one publication may be supplied on any one occasion (though different articles may apparently be supplied on different occasions). 'One publication' is not defined; it is probably generally interpreted, as the Copyright Committee recommended, as one issue rather than one volume or one periodical, and this seems reasonable.

4 The library must charge the recipient not less than the full cost (including a contribution to overheads). In an institutional library where members of the institution staff may reclaim from institution funds their expenditure on photocopies, this involved a great deal of internal accounting, but has no effect on the final situation; and this is one of the reasons why some librarians choose to avoid infringement by virtue of section 6 (fair dealing) rather than of section 7. I hope I am wrong in suspecting that some libraries fail to charge the full cost, but still think they are protected under section 7.

Since the provisions of section 6 (fair dealing) allow all that is needed, it is hard to see why any librarian should make use of the more cumbrous procedure of section 7 unless he feels that his judgment of what is fair cannot be trusted.

Books: single copies

I now turn to the question of books other than periodicals. For these, procedure under section 7 is of very limited help, and most library copying will have to be justified as fair dealing under section 6. The question that may arise here is 'How much is fair?' and it is not always easy to answer on general grounds.

Here, fortunately, the 'general licence' of the Society of Authors and the Publishers Association is very helpful indeed. They say that 'as representatives of the generality of copyright owners', they 'would not normally regard it as "unfair" if a single copy is made from a copyright work of a single extract not exceeding four thousand words, or a series of extracts (none of which exceeds three thousand words) to a total of eight thousand words, provided that in no case the total amount copied exceeds 10 per cent of the whole work. Poems, essays, and other short literary works must be regarded as whole works in themselves, and not as "parts" of the volumes in which they appear'. This statement is perhaps not binding on individual members of the two bodies, and certainly not on other copyright owners, British and foreign; but any British court would clearly take account of it. Accordingly, it is reasonable for the librarian to regard as fair any copying which falls within these limits, as most copying from books which libraries are asked to do probably does. What about copying beyond them? Here the librarian must rely on his own sense of what is fair, and might well bear in mind the considerations I have suggested above.

Interlibrary copying

The Act makes special provision for the supply of copies by one library to another, but this may also be legitimate as fair dealing, particularly when small portions of works are copied to replace missing pages, or when photocopies are supplied in lieu of interlibrary loans—a practice naturally limited by its cost to small items.

Copying by individuals

Until ten years ago, most photocopying was done by libraries; but with the advent of apparatus which is easily operated by the layman, it has become increasingly common for individuals to make their own copies. This is legitimate if and (with certain exceptions) only if it is fair dealing for research or private study. It only concerns libraries if they place apparatus at the disposal of their readers. The Society of Authors and the Publishers Association say that libraries are responsible for the use made of such apparatus. Legally, I imagine, responsibility would be a matter for argument in any particular case of infringement; but morally, I am sure, a library should do all it can to prevent misuse. A reasonable practice would be for a library to allow a reader to copy only what the library would copy for him; and I believe this is usual.

Multiple copies

What has been said so far relates to the making of single copies, and the 'general licence' of the Society of Authors and the Publishers Association is restricted to them, as are the provisions of section 7. In other respects, the making of multiple copies is governed by the same general principles, with one important exception. The Act deals separately with copying for educational purposes, and it is clear that substantial amounts of copyright material cannot be reproduced for class use without the permission of the copyright owner. Such copies are nowadays often asked for by teachers, and the librarian must insist that before he makes them the permission of the copyright owner must be obtained. It is no doubt equally an infringement if without permission a library makes multiple copies to put into stock for loan to students in connection with their class work (even though their loan is not in itself an infringement as their sale or hire would be). It is perhaps not clear whether or not it is an infringement to make copies in answer to separate demands from individual students for copies of something that has been recommended to them in class—a situation that in any case is not always easy for the librarian to detect.

Apart from this case, if the making of a single copy is legitimate as fair dealing, the making of multiple copies will probably be legitimate, as, for instance, when a scientist gets a member of his research group to make photocopies of an article for all the members of the group. Librarians are sometimes asked at short notice to produce copies of published material for consideration by a committee, when there is not time either to buy copies or obtain permission; if the activities of the committee can be described as private study or research (which is not very likely) this would be legitimate; if not, it would be an infringement, though perhaps a venial one.

The influence of xerography

As we all know, library photocopying, after steady growth since the 1920's, has grown even faster in the past few years owing to the cheapness, quickness, and convenience of xerography. A certain amount of the demand for xerographic copies is due to its fashionable appeal, and this will no doubt die down, though its disappearance will also without any doubt be masked by the continuing legitimate growth.

Of its value to readers, there can of course be no doubt at all. University teachers are very emphatic about the improvement in undergraduate reading which it has brought about, and it has been equally valuable for research.

Copyright owners, on the other hand, are very rightly watchful lest their legitimate interests should be affected; so, I hope, are librarians, even if only out of self-interest, since most of their activities depend in the last resort on those of copyright owners. Of the photocopying done in or by libraries, I believe that only a very small amount is technically an infringement of the rights of authors and publishers, and that of that small amount only a very small proportion is in fact detrimental to their interests. Of the photocopying done on apparatus not under the control of such scrupulous persons as librarians, I do not think one can be quite so happy, judging from some requests that

librarians have to refuse; but even here it is unlikely that any significant damage is done.

On the other hand, there can be little doubt that in the long run the use of photocopies actually stimulates the use of printed originals, to the profit of authors and publishers. University teachers would not be so happy about the use of Xerox copies if they thought it had been at the expense of book-buying, for they are as anxious as any profit-hungry copyright owner could be that students should own more books. On the contrary, I am sure that in the long run, just as it is always found that an extension of library facilities produces, often embarassingly, an even greater demand for them, so the increased availability of literature through photocopies will bring a greater demand for real books, both borrowed from libraries and privately owned.

Acknowledgments

I am indebted to Mr R. E. Barker, Secretary of the Publishers Association, who opened the discussion following my address, and to all those who took part in it; their contributions enable me to hope that I have given the right answers to the questions that actually trouble practitioners. I am also indebted, not for the first time, to the helpful expertise of Mr W. A. Steiner, Librarian of the Squire Law Library, Cambridge.

APPENDIX: LIBRARY COPYING AND FAIR DEALING

It seems desirable to set out at some length the reasons for rejecting the view, set out by the Society of Authors and the Publishers Association in their joint statement on *Photocopying and the law*, that 'Legal precedent . . . has established that such "fair dealing" must be exercised by the individual for himself, and not by any one person on behalf of another.' This view, I believe, is founded on a passage on Copinger and Skone James on *The law of copyright*, 10th edition, 1965, ¶, 467), as follows:

> ' "Private study", it is submitted, only covers the case of a student copying out a book for his own use, but not the circulation of copies amongst other students.'

This passage, based on a 1916 case, first appeared in 1927 in the 6th edition of Copinger on Copyright—at a time, that is, before photocopying had become common enough to create a problem. In the different circumstances of today, it is somewhat ambiguous, at any rate in relation to the question we are considering now, which is not the circulation of copies amongst students, but the employment by a student of an agent (to wit, a library) to do his copying for

him. When one looks at the case which is quoted in support, the ambiguity is resolved. It is a case (1916, 2 Ch. 601) in which one publisher was suing for infringement another publisher, who had republished for profit material of which the copyright belonged to the first publisher; and 'fair dealing for purposes of private study' was pleaded in defence (amongst other things, and, one feels, not very hopefully). The relevant passage in the judgment is as follows: 'It could not be contended that the mere republication of a copyright work was a "fair dealing" because it was intended for purposes of private study.' For this justification of copying to be valid, the action in question must be *both* fair dealing *and* for private study; in this case the judge held that though it was for private study, it was not also fair dealing; and what he held to be unfair was publication for profit. This is in line with decisions in other cases, though they appear to be all in quite different fields from library photocopying. For instance, in *Glyn* v. *Weston Feature Film Company*, an entertaining case worth reading on its own merits, Mr Justice Younger spoke of 'the necessity of establishing that the alleged piracy is calculated to prejudice the sale or diminish the profits or supersede the objects of the original work'. Skone James similarly suggests that dealing will only be unfair if it competes with the original. In *Nicols* v. *Pitman* Mr Justice Kay held that though it was no infringement to copy a whole work for private use, it was an infringement to publish it for profit. The Courts seem in fact to have been guided by what seems in itself the reasonable principle that what is unfair is commercial exploitation and that anything else is fair.

It must be emphasized that in the references to fair dealing in the Act, in the regulations made under it, and in the cases, there is no restriction on the person or body by whom the copying is done; the exemption applies equally whether a research worker copies his extracts with his own hand, has them typed out by a research assistant, photocopies them himself, or has them photocopied by a librarian.

MICROFORMS IN INFORMATION RETRIEVAL AND COMMUNICATION SYSTEMS

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The paper reviews present microforms in use and indicates briefly their areas of application in particular to the library field. Likely future trends and developments bearing on the library and publishing fields are then detailed. Coverage is given to retrieval systems and devices. Finally the work of the newly established National Reprographic Centre for documentation in this area is outlined.

MICROFORMS (a generic term intended to denote any form of graphic or factual documentation reduced to a point where it is too small to be read by the unaided eye) have been a practicable proposition for over a hundred years. In spite of this long history it is generally true to say that their role until recently in library and information technology has remained that of a media to be used only where no other alternative exists. Librarians and information officers speak in terms of 'user resistance' and confine their microform applications to little-used material or to material where no reasonable alternative exists, that is where the original is out of print or otherwise unobtainable, or where storage and preservation otherwise presents formidable economics and technical problems—newsprint is a case in point. This concept of microrecording has in fact not been limited to the library field; in the business records and engineering drawing fields, microform activities in the past were largely categorizable as 'film, file and forget', while at one stage the American government undertook some microrecording operations as part of a 'records destruction program'.

It is significant that now that microforms have become a medium of major importance in the engineering drawing field, they are taking on an increasing role in the business records and electronic data processing fields. I intend in this paper to draw attention to microform developments likely to have a substantial influence on library and communication technology in the near future.

The major microforms at present in use, or coming into use, and their areas of application are as follows:

16 *mm. roll*, developed for the business records field and now coming into extensive use for computer output recording. Since an extensive range of modern equipment and techniques (such as cassette loading) have been developed for 16 mm. roll, it is also showing some signs of displacing the traditional

35 mm. roll as a publishing medium for serials intended for active use; the availability of *Chemical Abstracts* on cassette loading 16 mm. roll is an example.

35 *mm. roll*, the traditional microform medium for libraries, where it is used widely for recording books and serials. Additionally a wide range of serials are published retrospectively on 35 mm. roll. Due to the relatively large frame size it will probably remain indispensable for recording large sized (mainly newspapers) and poor quality originals. Since the library market for hardware has never been particularly lucrative for manufacturers, and librarians and documentalists have generally been very conservative in their demands, the available equipment is obsolete in concept. There has, for example, been a complete failure to develop cassette-loading readers for 35 mm.*—it is ironic to consider that at a time when the amateur camera enthusiast is no longer expected to load his camera by manual threading over rollers librarians still expect users (who may need to search several films in the course of an hour) to do so. The 35 mm. roll is likely to suffer in the immediate future from competition from the cassette-loading 16 mm. roll and the microfiche. In 1,000 ft. lengths it forms the basis of one of the more successful retrieval devices using image-associated optical codes.

Aperture cards, in standard form, consist of a single 35 mm. frame set into a standard eighty-column punched card. They were developed originally by the American Department of Defense to carry the reduced image of an engineering drawing, and conceived as an appropriate medium for contractors and sub-contractors to exchange graphic data on complex projects. Since aperture card systems generally regenerate prints at half size, substantial economies over contact print systems have been realized by many users. Allied to other factors such as the reduction of a variety of sizes to a single compact format, ease and economics in transmission, the elimination of print libraries, etc., this has resulted in a rapid growth of aperture-card-based engineering drawing systems. A British standard is due to appear shortly. In the general documentation field the aperture card has a limited application in its 'eight-up' form. The eight-up aperture card contains on its single 35 mm. frame the images of up to eight conventional sized (about international A4) document pages. In those systems where the length of the bibliographic unit averages below eight pages, therefore, this variant has potential. No doubt for this reason the aperture card is to be used for storage and dissemination by the US Patent Office. Recent proposals by the National Microfilm Association in the USA align the frame grid gauge requirements of the eight-up aperture card with those of the ninety-frame A6 (105 × 148 mm.) microfiche. The adoption of the 'eight-up' aperture card can bring substantial benefits in mechanized handling of documentation using available punched-card equipment. One British based international company is to use this method for disseminating information on its own and competitors' products to overseas associates.

* With the exception of the 'Selectacopy' device developed by Reprographic Services Ltd for a government department.

Microfiches were developed coincidentally in France and Germany prior to World War Two. During the war they were used to disseminate news of allied activities to the German armed forces and police. Subsequently, one of the originators, Dr Goebel, moved to Holland, which then became something of an international centre for microfiche promotion and development, via the activities of the Microfiche Foundation. In Holland the main emphasis has been on the use of the microfiche as a cheap copying medium by which a student or research worker can build up an entirely personal library, economic in both cost and space, of relevant material. Most of the significant libraries in Holland possess microfiche cameras (in marked contrast to the situation in the UK) and a popular reader is available to students there for £20. Most of the present importance of the microfiche in the UK, however, stems directly from the selection of the microfiche by the US government as a basis for its enormous technical publication programme. Many millions of standardized A6-sized, sixty-frame microfiches have already been produced and disseminated by the main US government agencies, and this format is being increasingly adopted by a wide range of international and other organizations. Publishing economics (a fully used, sixty-frame microfiche costs about c.1*d.* a page for materials) are such that there is an increasing trend towards 'microfiche only' publishing programmes. On the receiving end of these activities, technical libraries will need to place increasing emphasis on the provision of microfiche readers in adequate numbers at user reference points, since regeneration to hard copy is rational and economic on a selective basis only. A British Standard based on the sixty-frame, A6 formula, but continuing to permit the 5 × 3 inch size, is to appear shortly.

Micro-opaques were a publishing medium favoured mainly by the US government prior to its conversion to the microfiche. Large numbers were produced and large stocks exist in numerous libraries. Publication on micro-opaques is now restricted to one or two commercial publishers in the USA; one of the original commercial publishers, the Microcard Corporation, now produces microfiche. The main advantages of the micro-opaque were that it could be printed on both sides, and could be duplicated by non-photographic processes. Against these advantages, the reading of micro-opaques required the use of the relatively powerful light sources associated with episcopic optics; print-out of hard copy always presented technical difficulties and no really successful device was ever produced; and it is impossible to duplicate from a micro-opaque (only from the publisher's original negative). These were substantial restraints, and the micro-opaque is now falling into disuse. It is hoped that libraries and other organizations will not encourage the making of original material available for publication on micro-opaques, since this may prejudice the publication of the material on one of the more useable microforms.

PCMI. Microfiches employing ultra high reduction are being promoted by the National Cash Register company via its PCMI (photo-chronic micro image) process, and less actively in the UK via Republic Aviation's Micro Vue process.

The PCMI process uses the A6-sized microfiche and reduction ratios of, at present, 115 : 1 or 150 : 1. The latter ratio permits the recording of 3,200 pages on to a single microfiche. The microfiches are laminated to prevent damage to the image. Reading apparatus, conventional in size and appearance, is fully developed and is likely to be available on rental at approximately £1 a week. PCMI is essentially a publication process and the cost of the PCMI recorder is such that the operation would normally be carried out at an NCR centre. Early applications are likely to lie in the distribution of such things as motor parts catalogues where very substantial economies appear possible, but the recent acquisition by NCR of a major commercial microform publisher, the Microcard Corporation, may indicate much wider ambitions of direct significance to libraries. NCR claim that it is possible to get down to $1 per 3,200 pages for this process, thus bringing the cost per page to an infinitesimal amount. The main disadvantage from the users' point of view is that it is outside of what is at present the main-stream of development and requires special reading and print-out hardware. From the commercial publishing point of view the page capacity per PCMI microfiche appears most appropriate to encyclopaedias.

8 *mm. roll* is being promoted for business records application by a well-known Swiss company which has produced an 8 mm. rotary camera-processor and a motor-driven reel-loading reader. The success of this venture in an area already firmly committed to 16 mm. roll is very questionable.

70 *mm. unitized or roll film* was used fairly extensively in the engineering drawing field prior to the appearance of the 35 mm. aperture card. While it still commands adherents who claim that the modest reduction ratios result in better quality regeneration from large or poor quality originals, the appearance of a British standard favouring the 35 mm. aperture card and, equally important, the existence of a wide range of modern hardware to exploit the aperture card as an active medium is likely to result in the demise of 70 mm. except possibly as a storage medium for little-used material. It has no significance in the textual documentation area.

Magnetic tape. The use of magnetic tape for recording textual and graphic documents has stemmed directly from developments in television recording technology. The only existing proprietary system is 'Videotape', produced by the Ampex Corporation. The two most significant system factors in the use of magnetic tape lie in its inherent erasibility—an important factor in systems where updating in the sense of replacing existing information by later material is a requirement—and its suitability for transmission by co-axial cable or microwave link. The Videotape base is a 2 in. wide magnetic tape across which the image is recorded in a series of diagonal magnetic tracks. In order to obtain satisfactory resolution, the number of scan lines is considerably increased over the number used in conventional television. Documents up to $8\frac{1}{2} \times 14$ in. occupy $\frac{1}{3}$ in. of linear space and the image is carried by 1,280 scan

lines regenerated fifteen times a second; documents up to $5\frac{1}{2} \times 8\frac{1}{2}$ in. utilize $\frac{1}{16}$ in. of linear space and 640 scan lines. Along the top of each tape is a narrow strip on which document address codes are recorded; each address has a capacity of seventy-two bits, giving twelve alpha-numeric or eighteen numeric symbols. Documents enter the system via a filing station, and address codes may be manually keyed in or entered automatically using preprinted, machine-readable codes, punched cards or punched tape. Several system variations are possible, but generally at this stage the documents go into a temporary storage (buffer) unit, then through an automatic sorting station which in turn passes them in appropriate order into the main Videotape store. Retrieval is a reverse of input; the number of the document required is keyed into the search station; the main Videotape store is searched; the information is transferred to a buffer unit, which then transmits it to the screen in the search station, while the main store is available for further searches. By exploiting available transmission systems to the full it would be possible for a remote user to dial the Videotape store on a conventional telephone, follow this by the number of the file or document required, and the information would then be transmitted to the screen on the user's desk by cable or microwave. Hard copy could then be produced as required by the user either at the central unit or—at greater expense—at the user's desk. The minimum cost of a Videotape unit, excluding transmission systems, would be £100,000. Materials costs in operating Videotape appear to be broadly comparable with those of 16 mm. roll film. The level of capital cost, however, clearly restricts the system to very large, very active (in the sense of reference rate and updating) filing and documentation systems. The cost of coaxial cable transmission within a building or complex of buildings is not excessive, but over longer distances via public service cables or microwave links costs increase enormously.

In the near future we shall see microforms playing an increasing role in technical and scientific documentation. An increasing number of official agencies and commercial publishers will publish on microforms in lieu of, or as an alternative to, full-sized publication, with, in the latter case, the price of the respective media reflecting the differences in production costs.

The following examples illustrate this trend:

The Defense Documentation Center, which issues publications in all forms to US government contractors, is now finding 15 per cent of requests opt for microfiche, whereas only 1 per cent did so when micro-opaques were used.

The Atomic Energy Commission is producing selected publications on microfiche only.

Another 'microform only' journal has appeared—the *International Microfilm Journal of Legal Medicine*, which is available on microfiche and 35 mm. or 16 mm. roll film.

Three trade and technical data services are now becoming operational in the UK: Technical Indexes are issuing their *Electronic Engineering Index* on 16 mm. roll in cassettes and possibly microfiche, Materials Data Ltd are offering their ferrous and non-ferrous data card services on 16 mm. roll, while several areas are projected for coverage by the Visual Search Microfilm File (VSMF) service, using 16 mm. roll in cassettes.

Two particularly significant concepts in the library sphere lie in those of the duplicating library and the 'packaged' library. In the USA the Council on Library Resources has been particularly active in promotions bearing on the duplicating library concept. A definitive paper entitled *The economics of 'on-demand' library copying*,[1] by L. B. Heilprin, of the CLR, analyses the functions of libraries in an overall communications system, ranging from the original author to the eventual reader or user. He notes that the lending or circulating of material by libraries creates a loop in the flow line between those two points which, in a small circulating library, accounts for 80 per cent of the operating costs and in a large research library 10 per cent. To justify the elimination of the circulating or lending loop he states that it must be shown that the cost of the item is less than the cost of circulating it. He then demonstrates that this point has in fact been reached already in two ways: firstly by the arrival of the paperback, and secondly by a decrease in the length of scientific and technical communications combined with a decrease in the costs of copying. The decrease in length of communications is due to the fact that the book as a medium for announcing new technical and scientific theories and discoveries has been replaced by the periodical article or technical paper. The result of this is that libraries are increasingly substituting copying for lending.

Heilprin's concept has been covered in some detail because (1) the per-page costs of microcopying will always be substantially less than those of full-sized copying, and (2) the CLR is actively promoting the development of microfiche cameras which, given successful development, may rival existing full-sized copiers in ease and speed of copy production. (These being the Bell and Howell micro-xerographic camera, and the Houston Fearless silver halide camera-processor.) In England two devices with similar capability are under development, Caps Equipment Ltd have a prototype Kalvar camera, while Holtronics Ltd have patented a silver halide lozenge system (in which a lozenge of silver halide is applied to the next vacant frame space of a microfiche prior to exposure, thus permitting the adding of new images to a partly used microfiche). All of these devices would permit 'on demand' or even 'do it yourself' production of microfiches, which would be fully processed within seconds of exposure. Apart from the Houston Fearless device, they also permit the updating of microfiche by the addition of new images in vacant frame spaces.

The 'packaged' library concept represents an advanced exploitation of the positive merits of microforms at the conventional level. Exploiting the low per page duplicating costs, ease of postal transmission and minimal space requirements of microforms, it has become feasible to collect, index and disseminate complete libraries of material on selected subjects and to provide the user effectively with an indexed, updated, desk-top library. The Medical Research Council's project FAIR covering the biological engineering field has already been described.[2] The National Reprographic Centre for documentation is to provide a similar service in the reprographics field, and complete subject groups of US patents are to be made available on aperture cards by the US Patent Office.

The widespread application of the 'packaged' library concept will ultimately

require a drastic overhaul of the copyright system. Both of the existing British schemes mentioned above are going ahead with the co-operation of publishers, but ultimately some formal method of feeding back royalties to copyright owners will be needed, and part of the purpose of the NRCd service will be to explore the parameters of copyright requirements in practice. Meanwhile American proposals envisage the allocation of a multi-digit number to each item and a central clearing-house using EDP techniques, while in Holland informal arrangements between libraries and publishers are sufficing.

Microform-based subject retrieval systems break down into two distinct categories: those in which the search function is separated from the store function, and those in which the two functions are combined, using image-associated optical codings. The former type embraces a very wide spectrum of applications ranging from a simple card or similar manual index, indicating the address of required items in the microfilm store in terms of reel number and rough meterage location on the roll, to roll or microfiche systems on-line to computer search facilities.

Methods for locating material on roll microfilm relate to (*a*) Meterage systems —which involve the use of readers which meter the film as it passes through and provide a simple digital display akin to a car odometer (as on the 3Ms Filmac 400); (*b*) Target flash—in which frames are left unexposed at regular increments through the film during the recording operation. On negative film these appear as white flashes on the screen as the film is driven through the reader—frame 330 might therefore appear shortly after three such flashes had been counted; (*c*) Moving code-line systems; patented by the Eastman Kodak company as 'Kodamatic', this involved the use of a modified camera which records a series of lines on the film. When the processed film is driven through a reader, the lines can be referenced to a simple scale along the edge of the screen. This is one of the systems used by *Chemical Abstracts*; (*d*) Frame count; these techniques involve the recording of optical 'blip' against frames. Retrieval is by means of readers equipped with electronic count circuitry. Since the 'blips' do not necessarily have to be recorded on consecutive frames and since the number series, using the latest equipment, may be continuous irrespective of reel, it is possible to locate items by assigned number irrespective of frame or reel location. It would be possible, for example, in a co-ordinate indexing system, to locate items by the serial number allocated in the co-ordinate system. Frame counting readers using 16 mm. cassette-loaded film are made by Kodak, and a 35 mm. cassette-loading frame-counting reader, the Selectacopy, has been developed by Reprographic Services Ltd.

The Californian firm, Houston Fearless, has evolved particularly interesting equipment for automatic access to a microfiche store. The device, known as the 'Filmcard' reader, uses the standard A6 microfiche as its data base. Each unit holds 750 microfiches in a rotating drum. The fiches, which may be standard, published fiches, are coded by means of edge-punched metal strips clipped to the top edge. Selection is by means of an automatic needlesort mechanism. Two sets of ten keys give access to the store. Use of the first set selects the appropriate fiche and displays the index page on the screen; the second set then selects the required page. Alternatively, if the 'page' address is known in the

first instance, access to it may be direct. Drum stores are quickly interchangeable. Two particular advantages are that the microfiches are not handled by the user and cannot get lost or misfiled, and that outdated fiches can be replaced without recoding. The units will cost about $3,000 each.

Numerous combined search store devices have been developed, invariably combining micro-images of the original material with optical codes representing featured terms. They may use roll film or individual chips. Retrieval involves a selector through which the film or chips are passed and which is pre-programmed manually or otherwise to search for a required combination of codes. Collectively they have not commanded a wide range of applications. In 1963, for example, C. P. Bourne, of the Stanford Research Institute, could trace only thirty-eight operational systems. This was, however, prior to the introduction of the relatively inexpensive Kodak Miracode system. Factors influencing this state of affairs would seem to relate to the following: (1) Complete system flexibility seems to equate with high capital cost. For example, the Benson Lenher FLIP costs $75,000; Kodak Minicard $12,000,000; Ferranti Packard Rapid Access Look-up $17,000; IBM Walnut $1,000,000; Filesearch £60,000; (2) The requirement only emerges when file conversion costs have reached prohibitive levels; (3) No 'packaged' services are available, with the exception of Miracode, for which *Chemical Abstracts* is available in coded form; (4) The systems are inflexible where reclassification or vocabulary revision becomes necessary; (5) There is a lack of information on the performance of existing systems, many of which are used in security applications in US government agencies.

The systems are described in detail in NBS Technical note 157[3]. Two of the most successful commercially are:

Filesearch, which uses 35 mm. roll film in 1000-ft. lengths. Input is flexible with manual or automatic coding. Material may be in random order with breakdown into required subdivisions taking place afterwards. Output may be by (*a*) Display on screen, (*b*) Hard copy, (*c*) Duplicate microfilm. The price is £60,000.

Kodak Miracode achieves a lower price at the expense of flexibility, so far as library systems are concerned, by using basic 16 mm. roll material and hardware. The 16 mm. is retained in standard 100-ft. lengths in Kodak cassettes. Output is via screen displays. There is no facility to subdivide the material after recording, so input cannot usually be in random order. The price is relatively low; at £11,000 one can search three keywords simultaneously.

The most substantial advantage of both types of microform-based retrieval systems over alternatives relates to the rapid presentation of replicas of the original material. This eliminates the archaic manual retrieval of originals from shelves, files and outside sources, and to that extent eliminates the need for the abstract as an intermediate.

If the immediate future of microforms in the library and publishing fields looks promising, the same cannot be said of the immediate past. We have failed to exploit the positive attributes of the microform, and have treated it as a 'second best' medium. We have expected our readers to use poorly designed and often badly maintained equipment. Expensive mistakes have been made

in the choice of microforms, and until the comparatively recent activities in the USA there has been a lack of standardization (even now we still await the appearance of British Standards for microfiche and engineering drawings, while much of BS 1371 : 1956 on readers and reels is out of date). There has been a lack of quality control in microforms produced and this, combined with inadequate readers and printers, has promoted user resistance. The small size of the market has resulted in high unit costs. There has been an overall lack of direction.

These were the reasons which led Gordon Wright to initiate the original twenty month microforms investigation which took place under an OSTI grant.* The situation revealed during the course of this investigation had led OSTI to establish the National Reprographic Centre for documentation, also under the direction of Gordon Wright. The NRCd hopes to influence the future development of microform systems and hardware on a broad front:

It will carry out systems evaluations and studies. To influence improvements in equipment design, it will publish evaluation reports on readers and other items of hardware. (The first of these on an inexpensive general purpose reader from University Microfilms has just been completed.)

In the sphere of education it will promote a regular series of seminars and courses on specific applications.

It will publish a trade literature and a packaged library service covering the reprographic field.

The centre is to operate in close collaboration with the Library Technology Program in the USA and close liaison is also being maintained with the Microfiche Foundation in Holland.

It will operate an inquiry and consultancy service.

A small team consisting of a design engineer, a lecturer in reprography, a photographer, a secretary, an operator and myself is already at work. Together with allied organizations active in the reprographic and library fields, we hope to see substantial developments in library microform applications over the next few years.

* The final report will be available in the near future.

REFERENCES

1 HEILPRIN, L. B. The economics of 'on demand' library copying. National Microfilm Association Proceedings, 11th annual meeting and convention 1962, pp. 311–33. Annapolis, Maryland, National Microfilm Association.

2 PICKFORD, A. G. A. FAIR (fast access information retrieval) project; aims and methods. *Aslib Proceedings*, Vol. 19, No. 3, pp. 79–95.

3 NATIONAL BUREAU OF STANDARDS. Technical note 157: Information selection systems retrieving replica copies: a state of-the-art report. US Department of Commerce, National Bureau of Standards 1961.

ADAPTATION TO USERS' NEEDS

A. MAUPERON
CID—EURATOM

Aeronautical Group Conference, Friday 31st March 1967

The Center for Information and Documentation of Euratom has created a computer-aided documentation system covering nuclear energy; co-ordinate indexing of abstracts is used both for input and output and keywords are listed in a pre-established thesaurus.

Users' behaviour studies based on a few months operating experience indicate that relevance is considered satisfactory; they also show that more emphasis than was expected is laid on completeness even if this involves older material.

Retrospective search results, in the form of abstract copies, are unanimously appreciated.

Selective dissemination of information provides nearly two-thirds of all requests.

OUR task at Euratom was comparatively easy to define: it was to supply nuclear information, primarily to the European Community, which has made our work possible, but also to any other country which may want it.

Nuclear science being still quite young (the first declassified reports were published only twenty years ago) the volume of literature bearing on this subject is relatively manageable; today, half-a-million documents have been published and the growth rate of our collection is approximately 120,000 items a year; moreover, a large proportion of these documents (40 per cent) are announced, with abstracts, in *Nuclear Science Abstracts.*

The users

Having assessed the amount of our raw material we had to try to get to know our users. By 'users' I do not necessarily mean only those who use information, but also those who stand to benefit from its use. The 'potential users' are active in numerous fields—research and development, engineering, economics, law, insurance, education and training, management, documentation—to name only a few.

This diversity of activities suggests a corresponding diversity in outlook and information needs. Does this mean that the CID embarked on a psychological study of each of these categories of user? The answer is 'no', for two reasons. Firstly, we thought that such a study would be too costly in time and money; secondly, we believed it would be easier to scan and analyse the findings of the many specialized organizations which had already carried out such research.

Many hundreds of user studies concerning scientific and technical information have been reported (the Auerbach report mentions 676 such studies). Their methodology (poor analysis, data collection, sampling, etc.) has often severely

limited the value of the results obtained; often they confuse 'needs' and 'use pattern'. Users' habits, their lack of training or skill, the effects of insufficient documentary resources, or unhappy experience usually make 'use' statistics unreliable: what matters more than what the user does is, in many instances, what he ought to do. Intelligent and systematic research on users' needs has barely started.

The overall lack of significance of most of the results which came to our knowledge led us to think that we had been very wise in not attempting to try our hand at this very difficult game. Besides, as our preliminary studies started in 1961, the available material concerned only, for the most part, studies limited to library use. We therefore could not help but decide on an essentially pragmatic approach to the problem, and we certainly did quite a few things which the experts consider either unscientific or irrational!

Like almost everybody else, we decided, *for the user,* that he wanted two different services:

1. bibliographical searches in answer to specific individual queries, and
2. selective dissemination of information according to users' profiles.

As most of our potential users work for large organizations, we assumed that they would be served by well-stocked libraries; this meant, in turn, that we would not, as a rule, have to provide hard copies of documents to them, but that we could restrict our service to a mere mention, or description, of the relevant documents.

We then tried to assess the order of magnitude of the number of queries which we could expect to receive every day. For this, the behaviour of our colleagues in Euratom's research establishments provided a useful yardstick; these research workers belong to six different nationalities and their habits follow a wide enough range of patterns. We assumed, therefore, that we could safely expect from the countries of the Community a number of queries proportional on the whole to the number of the potential users, the factor being approximately one-tenth, i.e. one query for every ten scientists each year.

This meant that we would have to answer about twenty-five queries a day; this number and the volume of our files justified, in our eyes, the partial use of a computer, as long as one was available for other purposes.

From 1964 onwards we were allowed to use an IBM 1401. This was replaced in January 1966 by an IBM 360/40 F/65 K with twelve tape reading units and two disc units; a mass memory will be added next month; we were allotted about eighty hours machine time each month.

We then had to make some fundamental decisions:

Scope

This was defined after consulting those responsible for the nuclear documentation centres in the countries of the Community; a few areas which are strictly speaking not nuclear, but are nevertheless of interest to Euratom, have also been included. All in all, our scope is not very different from that of the USAEC and the UKAEA, except that it lays greater emphasis on health and safety and the applications of radioisotopes and radiation.

Coverage

Theoretically, to attain a good coverage, the best solution would have been to acquire all in-scope publications (there are at the present moment more than ten thousand periodicals in the world which deal partially or entirely with nuclear energy, plus approximately twelve thousand reports every year). This would have been too costly and would have required too much room. We decided to use instead secondary (or abstracting) periodicals. Contrary to a rather widespread assumption, using an abstract instead of a full text in a retrieval-oriented documentation system does not cause a significant loss of information. On the other hand, the time lag which is inherent in the publication of secondary periodicals is sometimes considerable, and prevents the documentalists who use them exclusively from supplying their customers with recent literature.

We scan about forty secondary periodicals and information sources, containing on an average nearly one million abstracts, 20 per cent of which are within our scope. A special computerized check to detect and eliminate duplicates has been evolved; this program involves a system of priorities, so that a high-quality English language abstract will enter the system, even if a low quality foreign language abstract of the same document has already been indexed and stored; 120,000 references a year then are retained (fifty thousand of these being found in *NSA*).

Indexing

The scientific and technical documents—or rather their abstracts—written in natural language have to be turned into information expressed in terms of a documentary language readily understandable by a computer. To do this, indexing is necessary. Indexing is, to all intents and purposes, a form of classification, and classifications can be divided into two distinct groups: those with a hierarchy (e.g. Dewey, UDC, Library of Congress), and those without (including systems of co-ordinate indexing).

Classification of the UDC type are doubtless very appropriate when the collections to be indexed cover numerous fields and when this coverage is not too deep; their use in a mechanized system, however, poses problems which, owing to the shortcomings of present-day computers, are rather difficult to solve. Because of their all embracing character, they lack flexibility, and those who use them very often have to compile glossaries for their specialized field.

The CID therefore decided to adopt, as a working tool, *simple* co-ordinate indexing, theoretically without hierarchy. Although some co-ordinate indexing systems include links and roles, whether these added complications are actually compensated for by added efficiency is not, at the present time, well enough established, and comparative studies should be undertaken to determine if their advantages justify their cost.

Thesaurus

Co-ordinate indexing consists of expressing by key-words (or descriptors), or groups of key-words, the essential concepts described or mentioned in the

literature being analysed. Here again a decision had to be made: should a key-word dictionary be compiled first, and its use made compulsory, or should the documentalists who had to analyse and index the documents be free to use any word which they thought suitable?

We preferred the pre-established thesaurus; its use by DDC–ASTIA, NASA, the Engineers Joint Council and others had conclusively shown its advantages:

(*a*) it provides for the elimination of synonyms which, should the computer fail to recognize them, would lead to misses and poor recall;

(*b*) it reduces the different grammatical forms of some words to a single one;

(*c*) it contains a relatively small number of key-words, with which both the documentalists and the card-punch operators who have to copy them can familiarize themselves quickly, thus reducing the risk of errors.

We decided to limit to a strict minimum the number of key-words in the thesaurus, but provided for the addition of supplementary terms whenever necessary, which do not act as modifiers of a subject heading, but add precision to the key-words; many of these additional terms are proper names (Mossbauer, effect, Wigner effect, Cerenkov light, etc.). The Euratom thesaurus is, therefore, a dual vocabulary which allows specific indexing for high recall ratio or, in other words, the thesaurus combines the advantages of a limited descriptor list insuring reliability of retrieval with that of a virtually unlimited vocabulary of index terms for precision of indexing (see *Journal of Documentation,* vol. 22, no. 2, p. 97).

Unfortunately, no serious, large scale statistical study has yet been undertaken to show if the possible disadvantages of the 'compulsory' thesaurus are excessive. These disadvantages are obvious:

(*a*) we know that the indexer, who has to use the thesaurus as a check list, must use key-words which, in his opinion, do not always rigorously describe the concepts expressed in the documents;

(*b*) it is possible that the small volume of the thesaurus restricts the depth of indexing;

(*c*) any change introduced in the thesaurus or any updating has to be notified at once to all the documentalists involved in both the indexing and the retrieval operations; this is comparatively easy, but, if the updating happens to affect analyses already completed, as is often the case, it can be a heartbreaking job.

We already know, from some DDC–ASTIA reports mainly, that highly structured thesauri paradoxically lead to dispersion of indexing without significantly contributing to its consistency. Unavoidably, the organized vocabularies used in traditional library work have very little in common with modern indexing; more redundancy is being introduced into the latter, based not on preconceived judgements and decisions, but on the frequencies of use of the words. This new trend must not be interpreted as implying that one method is better than another: it is a sign of the times and establishes the advent of computer-aided information processing.

The preparation of the Euratom thesaurus, together with a number of diagrams representing the hierarchical and other semantic relationships between the indexing terms, took long months of strenuous work. Among other problems,

we were faced with a political difficulty: the overwhelming majority of the world nuclear literature being published in English (in any case, English abstracts accompany almost always even Russian, French and Japanese literature) it seemed logical to use English as a carrier language for our documentation, and it would have been uneconomical to translate everything into the four official languages of the European Community; fortunately, the powers that be were understanding enough and English it was.

Basically, two ways were open to us. We could decide to analyse a large enough number of documents—say several thousand—assigning to them the terms found while reading the documents. By frequency counting and alphabetical listing of the terms thus collected, it would then be possible to select the most appropriate ones. This, of course, would have been very lengthy, and, once the thesaurus had been drawn up, would have necessitated analysing the same documents again. The other way was to examine and study carefully the lists of key-words already selected by other organizations working in the same fields or in related fields. This process was obviously much faster and presented the added advantage of drawing on a considerable fund of experience.

The CID is indebted to ASTIA, the National Library of Medicine, the Zentralstelle für Atomenergiedokumentation and the United States Atomic Energy Commission for the inspiration which their descriptors and subject headings provided. The most useful was obviously the *NSA* subject headings list. It contained, at the time, 12,809 concepts, of which only 7,208 had been used with significant frequency in the *NSA* subject indexes. Quite apart from any consideration of quality, this group of terms could have formed the basis for a thesaurus. However, although these subject headings were quite suitable as the skeleton of a subject index, they could not be used satisfactorily for the indexing of documents or queries; they contained too many terms covering compound complexes which could be expressed equally well by the combination of terms representing more basic concepts.

A concise version of the thesaurus was prepared and used to analyse a few thousand documents: frequency counting led to a few alterations and, in January 1964, the first edition of the Euratom thesaurus was published. It contained 4,470 key-words. Of these, 1,404 represented every known isotope; 1,230 covered general purpose terms; and 1,836 were inorganic chemical compounds. (These represented the possible combination of the 102 'element' key-words, such as *copper* and the eighteen anion key-words such as *sulphate*.)

The second edition of the thesaurus, of which part one has recently been published (Report EUR 500e, 2nd edition, Part One) contains 4,665 key-words; this represents an increase of only 4.5 per cent in three years, and we can safely assume that any further increase in volume of our thesaurus will stay within this order of magnitude.

The reason why I have dealt at such length with the thesaurus is that its principle has been, and still is, the subject of much controversy. Some point out that using natural language, at the expense of additional computer time, would have a very strong user appeal; not only could authors index their own publications, but scientists could also formulate their own queries without

previous briefing. I cannot prove that this would not work; I only feel it would not, at least in the immediate future.

The fact that the USAEC, the Central Office of Scientific and Technological Information of the USSR State Committee on the Utilization of Atomic Energy, the Atomic Energy Commission of Israel, *Isotope Titles* (edited in East Germany) and, naturally, the member countries of the European community, use this thesaurus constitutes for us a very stimulating encouragement.

The Methods

We now have the raw material (the abstracts) and the tools (a computer and a thesaurus). How do we set about to make a usable documentation system? Indexers working for us under contract take care of the input (120,000 abstracts a year). The indexers are subject experts working in scientific institutes and industrial companies. The advantage of this decentralized operation is the high quality of the analyses. Consistency studies have conclusively shown that subject experts can judge the value of the publications to be indexed better than trained documentalists; it is also obvious that it is much easier to find subject experts willing to do this type of work on a part-time basis than to persuade high-quality experts to accept full-time indexing jobs. The analyses are then punched and loaded on to magnetic tapes. The accuracy of the indexers' work (i.e. its conformity with the thesaurus) is checked by a computer routine called the PIT (Processing of indexing terms) program, which also provides for the automatic correction of unavoidable spelling and keypunching errors, using a compilation on magnetic tape of all the errors already corrected. Another function of the PIT program is the automatic posting of documents to hierarchically related terms, with a view to enlarging the search range, particularly in SDI operations. The file structure is sequential, but we are contemplating changing over to an inverted type of file when a mass memory is added to our computer.

Retrieval operations involve a search strategy using Boolean operators (and, or, not). Convenient arrangement of key-words in the query formulation reduces the computer time to a minimum: processing twenty queries against a store of 500,000 documents now takes an average of eighteen minutes. The number of references expected to be retrieved in a given search can be roughly estimated beforehand using an empirical formula comprising the frequency of assignment of the descriptors in the query formulation. The computer prints out the reference numbers of the documents whose key-words match those of the query. These documents are then screened by experts who make sure that they are relevant.

Inquirers receive, in answer to their queries, abstracts of the relevant documents and also of documents which are possibly relevant; the reason for sending the latter is twofold: it may be that reading the abstracts does not allow the documentalist to decide on the relevance of the document; on the other hand, it may be that the document is known not to be relevant, but so close to the question that it would very likely interest the inquirer.

What kind of service does Euratom offer to the users of its documentation? Since November 1966 an experimental service has been operating. It is available

to all Euratom's departments and establishments as well as to our contractors, free of charge. The only returns which we request from our users are their comments, good or bad, on our service. So far, this is limited to retrospective literature searches, as we shall start SDI only in September.

This short experience has been extremely useful to us. With only 550 searches done, it is naturally too early to speak of statistics. Nevertheless, we have obtained what we think constitutes valuable knowledge of our users' needs. As these needs are not always clearly defined or expressed, we have concentrated on the user's behaviour. Without undertaking exhaustive research into this, we came to recognize five main factors which influence this behaviour:

(*a*) the type of user—pure or applied scientists, engineers, technical staff and 'other users' (managers, professors, students, lawyers, librarians, economists, etc.).
(*b*) the subject field of the users
(*c*) the progress of the user's work
(*d*) his seniority
(*e*) his environment.

Type of user

The first factor above has been recognized, for obvious reasons, by many information specialists; as the CID had very little experience with what I termed 'other users', they will not be considered here. We found—but this may be a particular feature of our organization—that, although small in numbers, pure scientists show very well defined characteristics.

They rely heavily on their colleagues for information; this is understandable as, especially in the most advanced fields of pure science, the small number of specialists makes it easy for them to know one another. Many are members of what the Americans call 'invisible colleges'. Surprisingly, we found that the pure scientist is not content with fragmentary information, however relevant; he insists on exhaustive and comprehensive searches, and we have come to realize that what he needs is browsing material, inspiration even. Another aspect worth noting is the fact that the pure scientist often builds his own card file and nothing makes him happier than to be able to tell us 'I have, with only my brains, my two hands and my personal notes found three references which your million dollar machine did not find.'

The applied scientist, on the other hand, appears to be chiefly interested in research results as such; his field being broader than that of the pure scientist, what he wants is spread out in a much larger number of documentary sources. As he cannot scan them all—and he is conscious of this fact—he welcomes any help we can offer.

The information needs of the engineer are quite down-to-earth; they concen- apparatus, properties, processes, measurements, etc., and are usually concern trated in a very specialized field. His needs can very often be met by his librarian; this means, in turn, that quite a few of the questions which he sends us cannot economically be dealt with by our computer.

Technical staff pose a difficult problem, in our field at least. More often than not, their requirements, which are few, by the way, concern non-nuclear

information which we do not possess; we must therefore obtain this information for them from specialized centres, and this always takes longer than a computer run; complaints mostly concern delays and are addressed indiscriminately to traditional and mechanized documentation alike.

The 'other users' have not yet used our service often enough to enable us to draw any valid conclusions as to their behaviour.

Subject field

The influence of the second factor is not yet clear. It seems, for instance, that chemists are more information conscious than physicists, but what matters most seems to be whether the scientist deals with a well codified discipline or not; in the first case, he has the benefit of quite a few good information sources which cover his field adequately, and when he turns to us, his requirements are usually accurately stated and easily met. Those who deal in less codified disciplines and in borderline fields have to spread their efforts over a much wider area; as a corollary, they appreciate receiving from us, in answer to their requests, not only relevant but also possibly relevant material.

Progress of work

How the stage of completeness of their projects influences the needs of the scientists is well known, and our findings did not show any deviation from what could be expected. The need for information is highest at the beginning; later on, needs arise when difficulties are encountered, and the specificity of these difficulties compels the users to turn to us.

Seniority

The seniority of the user often goes together with a knowledge of information sources. The senior men know where to get information, even if it is far away; less experienced staff normally try local sources only unless intensive publicity reaches them.

Environment

Understandably, users in large organizations have many colleagues with whom they can exchange ideas; they can draw on the resources of good libraries, have the opportunity to go to symposia; their organizations are often the seat of such symposia and meetings; visitors are plentiful, etc. In smaller concerns, on the other hand, more time has to be devoted to production work; there are fewer opportunities for personal contacts, and users have to rely more heavily on whatever literature is available; in industry, users can usually rely on professional information staff on the spot.

There is one other factor which matters very much in an international organization like Euratom: is the nationality of the users significant?

We expected that the more documentation conscious users (Dutch and Germans) would put more questions to us than the Italians, the Belgians and the French. The facts have proved us wrong so far. Nothing indicates that the average Dutch user puts more queries to us than the average French user, for instance. Their questions do not show any marked difference either, except

that French users seldom wish to obtain references in many languages, because their linguistic abilities are often limited to a working knowledge of English and a little German. We intend to draw up proper statistics of our users' behaviour as soon as enough material is at hand; these will naturally be published, and we hope they will be found useful.

Conclusion

What have we done to adapt ourselves to our user's needs? Essentially, we have built up a computer-aided system which can answer speedily most scientific and technical nuclear queries by listing the references of the publications dealing with the subject. We found that the users wanted more than just bibliographical references, so we now provide abstracts as well, but this is where we draw the line. We do not believe that a documentation system such as ours should replace a library; it should, on the contrary, complete it. We expect, but this is a very wild guess, that about four out of five users' queries can and will be answered by his librarian whereas, for efficiency's sake, only one will have to be processed mechanically. We cannot yet provide recent references to our users (by recent I mean a few weeks old), and we shall not do so until we start, later this year, to analyse primary literature.

I said earlier that our work could easily be adapted to other fields of science. The Euratom Coal and Steel Community is contemplating building up its own documentation and has aked our specialists for advice on the compilation of a thesaurus; the European Parliament is considering a scheme similar to ours for information on agriculture. In this respect, I can see one major problem which we shall soon have to face: that of compatibility in methods, language and equipment (for instance, I heard recently of the difficulties encountered in this country in utilizing the material processed in America under the MEDLARS project, where different computers and tape sizes are used). This explains in large measure why so far we have done very little to decentralize our operations until we are certain that our system has reached maturity.

Our plans for the future involve providing for on-line operation of the computer. Several consoles located in our major establishments could be used to put queries to the computer. Before this can work efficiently, however, our staff will have to devote much time to the training of scientific staff. This will not be easy, not so much because scientists are not bright enough, but because there still exists, unfortunately, some kind of prejudice against documentalists and librarians. A few scientists still tend to consider that *they*, and nobody else, do useful productive work, while others are mere parasites. This situation is slowly improving, but it is to be regretted that this improvement is chiefly noticeable in America.

However, if management becomes documentation conscious, and makes documentation jobs more attractive, more scientists will be interested in this dynamic field; they will then be able to speak to the users in their own language and be accepted by them. If they succeed and manage to make intelligent use of the knowledge which is available, the millions of pounds currently wasted in doing again what has been done before may be assigned to more useful purposes.

Letter to the Editor

THE USE OF BIOLOGICAL LITERATURE*

Dear Sir,

In the epilogue, much is made of the difficulty of obtaining the actual papers in an extensive literature search, and the reference *versus* lending argument is again raised (p. 251). The impression is given that the searcher can only have what happens to be in the library, and must go elsewhere for the remainder: '*Journal of Experimental Medicine*—unlikely to be found or read outside a medical faculty library' (p. 257).

Even such a small library as ours would borrow *J. Exp. Med.* for a reader of our own, and any other essential references, whilst we would not only put his name on our waiting list for material on loan to other readers, but if needed urgently would immediately call them in for him. The NLL and NCL are mentioned briefly in the chapter on libraries (p. 14–15), but not in the later discussion of difficulties, so the image presented is that of an unhelpful and hidebound library service. Perhaps in a later edition this could be remedied.

I also challenge the same authors' statement in *Aslib Proceedings*† on the use of current awareness services by bench scientists '. . . possibly their only retrieval system—if they miss an item, it is too late.' In a limited number of situations it may be too late, but there are other cases, surely the majority, where the information has a potential future use. If the user will only take the librarian into his confidence *at the right time*, giving sufficient notice of a large-scale search, not frantically demanding all the material within twenty-four hours, nor busily applying for reprints and photocopies merely to lie in a file until he leaves for another field and they cease to have any practical value, we would all be better satisfied. Above all, if his library and/or information service proves unsatisfactory he should find out why; it may be because of insufficient briefing or misleading phraseology. If indeed the scope of the library in his company is too restricted to be useful, he should put pressure on the policy-makers within the organization to get its functions enlarged.

Yours faithfully,

MISS C. PILE,
Research Librarian

Milk Marketing Board,
Thames Ditton,
Surrey.
Wednesday 21st June 1967.

*Edited by R. T. Bottle and M. V. Wyatt, Butterworth 1966.
†*19* (4), April 1967

SELECTIONS FROM THE RECENT LITERATURE

ALL ITEMS listed may be borrowed from the Aslib Library, except those marked *, which may be consulted in the Library.

Books and Pamphlets

AITCHISON, T. M., *and* CLAGUE, P.
Selection and evaluation of an index language for an S.D.I. investigation. 12 p. tables. Paper given at ESRO/ELDO/Eurospace Colloquium on Advanced Documentation Systems and Technology Utilization, Nice, April 24–6, 1967.

ANGLO-CZECH DOCUMENTATION SYMPOSIUM, Ciba Foundation, London, 20–26 May 1967
Papers presented by D. J. Foskett, K. Cígler, J. Vorácek, J. Helbich, B. Buncl, J. Dorsky and I. Wiesenberger. pamphlets.

ARTANDI, SUSAN
Investigation of systems for the intellectual organization of information. Final report to the National Science Foundation. . . . New Brunswick, N.J., Rutgers State University, Graduate School of Library Service, 1967. 16 p.

ASH, LEE, *and* BRUETTE, VERNON R.
Inter-library request and loan transactions among medical libraries of the greater New York area. New York, Survey of Medical Library Resources of Greater New York, 1966. 199 p. tables. $5.

ASLIB. Electronics Group
Handbook of basic reference material for librarians and information officers in electrical engineering, compiled by Ellen M. Codlin. 4th ed. London, the Group, 1967. 40 p. 15*s*. (10*s* members).

BOOZ, ALLEN APPLIED RESEARCH, INC.
Mechanization study of the Technical Library, Air Force Research Laboratory, L. G. Hanscom Field, Mass. Bethesda, Md., the Corporation, 1966. [v, 28] p. 5 appendices. diagrs. $3.

BOOZ, ALLEN APPLIED RESEARCH, INC.
Study of mechanization in DoD Libraries and information centers. Bethesda, Md., the Corporation, 1966. [xix, var. paging.] tables.

BOTTLE, R. T.
Courses in the use of scientific and technical literature in Central and Eastern Europe: a report to the Goldsmiths' Company on a study tour undertaken in April–August 1966. Bradford, University of Bradford, 1966. 15, 3 p.

BRANDHORST, W. T.
Experience with large-scale machine vocabularies. 20, [18] p. tables, diagrs. Paper given at ESRO/ELDO/Eurospace Colloquium on Advanced Documentation Systems and Technology Utilization, Nice, April 24–26, 1967. Session 3, Indexing Languages and Evaluation Techniques.

BRITISH JOINT COMPUTER CONFERENCE, 1966.
Proceedings. London, [Institution of Electrical Engineers], 1967. 287 p. tables, diagrs. 75*s*.

BRITISH STANDARDS INSTITUTION
Recommendations for the abbreviation of titles of periodicals. London, the Institution, 1967. 87 p. (B.S. 4148 : 1967). 40*s*.

BURNETT, ALFRED DAVID
Co-operative cataloguing: problems and prospects, a research paper submitted to the Catalogue Working Party of the Libraries and Computers Group in February 1967. [Newcastle upon Tyne University, Computer Group], 1967. iii, 25 p. tables, diagrs.

A CASE for a 'professional communicator' [report of an interview with C. W. Hanson and D. Bullivant]. Extracted from *Times Review of Industry*, vol. 4, no. 12, December 1966, p.80–82.

CONGRESS OF THE INTERNATIONAL FEDERATION OF TRANSLATORS (FIT), 4th, Dubrovnik, 1963.
Ten years of translation: proceedings . . . edited by I. J. Citroen. Oxford, Pergamon Press, 1966. xxi, 398 p.

ENGINEERS JOINT COUNCIL
Thesaurus rules and conventions. New York, the Council, 196[7?]. [7] p. tables.

*EUROPEAN PACKAGING FEDERATION
Classification schedules: classification schedules and alphabetical index for packaging documentation. London, the Federation, [196?]. 123 p. £4*s*. Based on an original scheme by D. J. Foskett.

EVANS, B. AGARD, *and* NICKLIN, EGIL
Building classification practices. Rotterdam, International Council for Building Research Studies and Documentation, 1965. 25 p. *Sw. Fr.* 15.

FOSKETT, D. J.
Information service in Libraries. 2nd ed. London, Crosby Lockwood, 1967. viii, 153 p. 20*s*.

FOSTER, F. G.
Standard numbering in the book trade: an inquiry carried out by the Publishers Association: a report. London, Publishers Association, 1967. 9 p.

GEORGE WASHINGTON UNIVERSITY. Biological Sciences Communication Project
Survey of practical training in information science, by Marilyn C. Bracken and Charles W. Shilling. Washington, the Project, 1967. 17, var. paging. tables.

GLICKMAN, ROBERT JAY, *and* STAALMAN, GERRIT JOSEPH
Manual for the printing of literary texts and concordances by computer. Toronto, University of Toronto Press; London, Oxford University Press, 1966. vi, 117 p. tables, diagrs.

HINDSON, RICHARD
Information systems for research and development. Motherwell, Colvilles Ltd., 1967. 10, [1] p. diagrs. Paper presented at Symposium on the management of research and development, University of Strathclyde and Ministry of Technology, Baird Hall, Glasgow, 4–6th April 1967.

ILLINOIS. University. *Graduate School of Library Science*
Proceedings of 1965 Clinic on library applications of data processing, Urbana, Illinois, 1965. Urbana, the University, 1966. vii, 201 p. tables, diagrs. $2.

INDIAN STATISTICAL INSTITUTE. Documentation Research and Training Centre
Annual Seminar 4, 1966. Bangalore, the Centre, 1966. 618 p.

ISOTTA, N. E. C.
Operational aspects of space documentation service. 9, [14] p. tables, diagrs. Paper given at ESRO/ELDO/Eurospace Colloquium on Advanced Documentation Systems and Technology Utilization, Nice, April 24–26, 1967.

KISH, JOSEPH L., *and* MORRIS, JAMES
Microfilm in business. New York, Ronald Press, 1966. viii, 163 p. illus., tables, diagrs. $7.50.

MACDONALD & EVANS, LTD
The manual of modern business equipment: filing systems, edited by G. Lawrence Mercer. 3rd ed. London, Macdonald & Evans, 1966. 55 p. illus., diagrs.

MACDONALD & EVANS, LTD
The manual of modern business equipment: photography and photocopying, edited by G. Lawrence Mercer. 3rd ed. London, Macdonald & Evans, 1967. 44 p. illus., diagrs. 6*s*.

MILITARY LIBRARIANS WORKSHOP, 10th, San Diego, Calif., 12–14 October 1966
Library employee development: proceedings . . . San Diego, Calif., U.S. Navy Electronics Laboratory, 1967. 79 p.

MORGAN, JOHN S.
Practical guide to conference leadership. New York, McGraw-Hill, 1966. xii, 292 p. $7.95.

PAGE, S. B.
Modern office copying: photocopying, duplicating and near-print. London, Andre Deutsch, 1966. 176 p. illus., diagrs. 21*s*.

RANGANATHAN, S. R., *and* GOPINATH, M. A.
Library book selection. 2nd ed. London, Asia Publishing House, 1966. 436 p. 55*s*.

RUSSELL, MARTIN, *and* FREEMAN, ROBERT R.
Computer-aided indexing of a scientific abstracts journal by the UDC with UNIDEK: a case study. New York, American Institute of Physics, 1967. iii, 29 p. illus. (UDC Project rep. no. AIP/UDC–4).

RYAN, PETER
The preparation of manuscripts. Carlton, Victoria, Melbourne University Press, 1966. v, 23 p. 6*s*.

SHIRLEY, DAVID
A guide to computer input preparation. London, Business Publications Ltd., 1967. 84 p. illus., diagrs. 21*s*.

SNAPE, W. H., *ed.*
Work study in libraries: report on a Work Study Appreciation Course held at Pendrell Hall, Staffs., for West Midlands Librarians, 21–24 November 1966. Stafford, County Library, 1967. 12 p.

SPEIGHT, FRANK Y., *and* COTTRELL, NORMAN E.
The EJC engineering information program—1966–67: a progress report on the role of Engineers Joint Council in improving dissemination information and data. New York, the Council, 1967. 45 p. diagrs.

STANDARD BOOK NUMBERING AGENCY
Standard Book Numbering: incorporating the recommendations of the Publishers Association for implementing the Standard Book Numbering Scheme. London, the Agency, 1567. 10 p.

*UNESCO. Centro de Cooperacion Cientifica para America Latina
Scientific institutions and scientists in Latin America. 2nd ed. Montevideo, the Centre, 1963–5. 24 vols.

UNITED STATES. Library of Congress. *Serial Division*
Popular names of U.S. Government reports: a catalog, [compiled by] Donald F. Wisdom and William P. Kilroy. Washington, U.S.G.P.O., 1966. v, 32 p. 30*c*.

UNITED STATES. National Science Foundation. *Office of Science Information Service*
Nonconventional scientific and technical information systems in current use, no. 4. Washington, U.S.G.P.O., 1966. xxx, 558 p. tables. (NSF 66–24.)

Articles and Papers

ADAMS, WILLIAM MANSFIELD
Relationship of keywords in titles to references cited. *American Documentation,* vol.18, no.1, January 1967, p.26–32.

ALTMANN, BERTHOLD
A multiple testing of the natural language storage and retrieval ABC method: preliminary analysis of test results. *American Documentation,* vol.18, no.1, January 1967, p.33–45.

ARMITAGE, JANET E., *and* LYNCH, MICHAEL
Articulation in the generation of subject indexes by computer. Paper presented at 153rd National Meeting of the American Chemical Society, Chemical Literature Division, Miami Beach, Fla., April 1967.

ARMITAGE, JANET E., *and others*
Documentation of chemical reactions by computer analysis of structural changes. 24p. diagrs. Paper presented at 153rd National Meeting of the American Chemical Society, Chemical Literature Division, Miami Beach, Fla., April 1967.

BAGLEY, D. E.
Evaluation of new indexing and abstracting journals. *Northern Aslib Bulletin,* vol.11, no.4, October–December 1966, p.27–30. Paper presented at the Joint Conference of the Aslib Northern and Midlands Branches, held at Llandudno, May 1966.

BAKER, C W., *and others*
A film system for the duplication of Termatrex cards. *American Documentation,* vol.18, no.2, April 1967, p.55–8.

BAKER, K. J.
Unit concept co-ordinate indexing. The cost of setting up and operating a system. *Northern Aslib Bulletin,* vol.11, no.4, October–December 1966, p.3–27. Paper presented at the Joint Conference of the Aslib Northern and Midlands Branches, held at Llandudno, May 1966. Co-ordinate indexing system at British Insulated Callenders' Cables Ltd.; thesaurus construction, equipment, cost, time and method. Equipment listed under manufacturer.

BERKNER, DIMITY S.
Two library work-study programs in the Boston area. *College and Research Libraries,* vol.28, no.2, March 1967, p.120–8.

BERLIN, SY
An advanced classified document control system. *Special Libraries,* vol.58, no.3, March 1967, p.160–5. Automated system designed to control government documents, including automatic downgrading notification; programming language used was COBOL.

BOTTLE, E. T.
Sandwich courses and the literature explosion. Extracted from *The Technologist,* vol.3, no.1–2, 1966, p.57–9.

BOYLAN, NANCY G.
Identifying technical reports through U.S. Government Research Reports and its published indexes. *College and Research Libraries,* vol.28, no.3, May 1967, p.175–83.

BRAUN, HORST
Experiences of West German libraries in delivering xerocopies of articles instead of sending bound volumes and periodicals. *IATUL Proceedings,* vol.2, no.1, January 1967, p.36–8.

BRITISH books to be numbered beginning this month. Copied from *Publishers Weekly,* vol.191, no.1, 2nd January 1967, p.28–9.

BUSH, DORCAS
Problems in translation. *Special Libraries,* vol.58, no.3, March 1967, p.173–8. Pilot study of problems met by 60 pharmaceutical and chemical firms in America.

CAMMACK, FLOYD, *and* MANN, DONALD
Institutional implications of an automated circulation study. *College and Research Libraries,* vol.28, no.2, March 1967, p.129–32.

CLOUGH, EVALYN
Translation services in an engineering library. *Sci-Tech News,* vol.21, no.1, Spring 1967, p.8–9.

COLLISON, ROBERT L.
Indexing deeds and documents. *The Indexer,* vol.5, no.3, Spring 1967, p.113–23.

COOK-RADMORE, D.
Chinese and Japanese translation rates. *The Incorporated Linguist,* vol.5, no.4, October 1966, p.112–13.

DELAVENAY, EMILE
The UNESCO Department of Documentation, Libraries and Archives. *Unesco Chronicle,* vol.13, no.4, April 1967, p.152–6.

DOWNS, ROBERT B.
The place of college librarians in the academic world. *California Librarian,* vol.28, no.2, April 1967, p.101–6.

ELECTROSTATIC COPYING: a Repro survey. *Repro,* Winter 1966, p.21–41, 52.

FANG, IRVING E., *and* LEWIS, JAMES R.
Using a computer to print a dissertation. *College and Research Libraries,* vol.28, no.2, March 1967, p.110–12.

FLANNERY, ANNE, *and* MACK, JAMES D.
Mechanized circulation system, Lehigh University library. *IATUL Proceedings,* vol.2, no.2, May 1967, p.12–23.

GRAYSON, T. J.
Some aspects of industrial classification in the Soviet Union. *Aslib Proceedings,* vol.19, no.5, May 1967, p.129–45.

HAMNER, WALTER C.
Mechanized circulation control at the McKeldin Library, University of Maryland Library. *IATUL Proceedings,* vol.2, no.1, January 1967, p.30–3.

HAEO, ROBERT P.
Book selection in academic libraries. *College and Research Libraries,* vol.28, no.2, March 1967, p.104–6.

HATTERY, LOWELL H.
Microfiche comes of age as a publishing medium. Copied from *Book Production Industry,* December 1966, p.46–9.

HAVILAND, MORRISON C.
Loans to faculty members in university libraries. *College and Research Libraries,* vol.28, no.3, May 1967, p.171–4.

HEAD, ROBERT V.
Management information systems, a critical appraisal. Copied from *Informatie* (Netherlands) vol.8, no.12, December 1966, p.4–11.

IDEGEN nyelvu összefoglalók [mechanization of library procedures]. Special issue. *OMKDK,* no.26, 1967. Covers equipment available in Hungary, mechanized production of catalogues, loans procedures, facsimile transmittal.

JACKSON, IVAN F.
An approach to library automation problems. *College and Research Libraries,* vol.28, no.2, March 1967, p.133–7.

JANDA, KENNETH, *and* TETZLAFF, WILLIAM H.
Trial: a computer technique for retrieving information from abstracts of literature. Copied from *Behavioral Science,* vol.11, no.6, November 1966, p.480–6.

JESSUP, FRANK W.
The Library Advisory Council for England. *Library Association Record,* vol.69, no.5, May 1967, p.149–50.

JONES, KAREN SPARCK, *and* JACKSON, DAVID
Current approaches to classification and clump-finding at the Cambridge Language Research Unit. *Computer Journal,* vol.10, no.1, May 1967, p.29–37.

KAULA, P. N.
Techniques of teaching library science. *Library Science,* vol.4, no.1, March 1967, p.83–93.

KILGOUR, FREDERICK G.
Systems concepts and libraries. *College and Research Libraries,* vol.28, no.3, May 1967, p.167–70.

KOCHEN, MANFRED, *and* TAGLIACOZZO, RENATA
Book-indexes as building blocks for a cumulative index. *American Documentation,* vol.18, no.2, April 1967, p.59–66.

KOZUMPLIK, W. A., *and* LANGE, R. T.
Computer-produced microfilm library catalog. *American Documentation,* vol.18, no.2, April 1967, p.67–80.

KUVSHINOFF, BORIS W.
A graphic graphics card catalog and computer index. *American Documentation,* vol.18, no.1, January 1967, p.3–9.

LAMSON, B. G., *and* DIMSDALE, B.
A natural language information retrieval system. Copied from *IEEE Proceedings,* vol.54, no.12, December 1966, p.1636–40.

LANGNER, MILDRED CROWE
The National Library of Medicine's services: initial observations on indexing, interlibrary loan, and reference. *Bulletin of the Medical Library Association,* vol.55, no.1, January 1967, p.31–7.

LEBOWITZ, ABRAHAM I.
The AEC Library serial record: a study in library mechanization. *Special Libraries,* vol.58, no.3, March 1967, p.154–9.

LEE-HSIA, HSU TING
Problems of cataloguing Chinese author and title entries in American libraries. *Library Quarterly,* vol.36, no.1, January 1966, p.1–13.

LIBBEY, MILES A.
The use of second order descriptors for document retrieval. *American Documentation,* vol.18, no.1, January 1967, p.10–20.

LIBRARIES in the computer age. *Bookseller,* no.3204, 20th May 1967, p.2286–7. Report of papers given at Library Association annual conference, 1967: F. G. B. Hutchings and H. T. Hockway.

LIEBESNY, F.
Patents for the physicist. Reprinted from the *Bulletin of the Institute of Physics and the Physical Society,* November 1966, p.374–7.

LONG, JOHN M., *and others*
Dictionary buildup and stability of word frequency in a specialised medical area. *American Documentation,* vol.18, no.1, January 1967, p.21–5.

LUFKIN, J. M.
Human v. machine: translation of foreign languages. *Lebende Sprachen,* vol.12, no.2, 1967, p.35–8.

LUFKIN, J. M., *and* MILLER, E. H.
The reading habits of engineers—a preliminary survey. Copied from *IEEE Transactions on Education,* vol.E–9, no.4, December 1966, p.179–82.

MANPOWER : a dialogue. *Library Journal,* vol.92, no.9, May 1st, 1967, p.1799–1801. Report of a special manpower conference, Washington, D.C., 9–11 March 1967.

MATHEWS, VIRGINIA H.
Statewide recruitment programs: guidelines for solving the professional manpower shortage. *Drexel Library Quarterly,* vol.2, no.4, October 1966, p.345–67.

MILLER, RUSSELL E.
College and university archives: the experience of one institution. *College and Research Libraries,* vol.28, no.2, March 1967, p.113–9.

MOSS, R.
Education for industrial library information. Part 1. The customer's viewpoint. *Northern Aslib Bulletin*, vol.11, no.3, July–September 1966, p.10–12. Paper presented at the Joint Conference of the Aslib Northern and Midlands Branches, held at Llandudno, May 1966.

NEELANEGHAN, A.
Research in library science: its need and its promotion. *Library Science*, vol.4, no.1, March 1967, p.37–56.

O'KEEFE, WILLIAM, *and* JACOLEV, RUTH L.
Spend your translation dollar wisely. *Sci-tech News*, vol.21, no.1, Spring 1967, p.6–7, 16. An outline of various methods of obtaining translations and the costs involved.

PCMI [Photochromic Micro-Imagery]—a new handling technique. *Data Processing*, vol.9, no.3, May–June 1967, p.127–9. Photochromic Micro-Imagery (PCMI) enables up to 4,000 images to be stored on a single transparency 4 x 6 ins.

PETERSEN, CORD W.
Nadellochkartei oder Sichtlochkartei für die Dokumentation? [Edge-notched cards or peek-a-boo cards for documentation?]. *Nachrichten für Dokumentation*, vol.18, no.2, April–May 1967, p.53–6.

POOLE, J. E.
Mechanising mathematics. *Monotype Newsletter*, May 1967, p.19–22. Problems and method of mechanical typesetting for mathematics.

RANDALL, GORDON E.
Budgeting for a company library. *Special Libraries*, vol.58, no.3, March 1967, p.166–72.

RANGANATHAN, S. R.
Hidden roots of classification. *Library Science*, vol.4, no.1, March 1967, p.1–26.

A REFERENCE roundup: developments in communications, resources, cooperation, personnel, research, use of computers, and financing. *Library Journal*, vol.92, no.8, 15th April 1967, p.1582–5.

ROLLING, LOLL N.
Access to nuclear information today. Copied from *Nuclear News*, March 1967. p.14–18.

SAG, GEORGES
La documentation technique en Union Soviétique. Copied from *Chimie et Industrie*, vol.97, no.3, February 1967, p.429–30.

SALTON, G.
The European computer gap. *Communications of the ACM*, vol.10, no.4, April 1967, p.203. Comment on state of computer development in Europe: possible reasons for lag in production.

SALTON, GERARD
Information dissemination and automatic information systems. Copied from *IEEE Proceedings*, vol.54, no.12, December 1966, p.1663–78.

SEWELL, R.
Ten good reasons why we do not use a computer. *Northern Aslib Bulletin*, vol.11, no.3, July–September 1966, p.4–9. Paper presented at the Joint Conference of the Aslib Northern and Midlands Branches, held at Llandudno, May 1966.

SHERA, JESSE H.
Librarians against machines. *Science*, vol.156, no.3776, 12th May 1967, p.746–50.

SIMON, JULIAN L.
How many books should be stored where? An economic analysis. *College and Research Libraries*, vol.28, no.2, March 1967, p 92–103.

SMITH, RICHARD DANIEL
Paper deacidification: a preliminary report. *Library Quarterly*, vol.36, no.4, October 1966, p.273–92.

SNAPE, W. H.
Education for industrial library information. Part 2. The seller's viewpoint. *Northern Aslib Bulletin*, vol.11, no.3, July–September 1966, p.12–18. Paper presented at the Joint Conference of the Aslib Northern and Midlands Branches, held at Llandudno, May 1966.

SNODEY, S. RICHARD
Information retrieval—a comprehensive indexed bibliography of 1957–1961 world literature. Copied from *IEEE Transactions on Engineering, Writing and Speech*, EWS7, 1964, no.1, p.22–38.

[SPECIAL LIBRARIES ASSOCIATION].
A study of 1967 annual salaries of members of the Special Libraries Association. *Special Libraries*, vol.58, no.4, April 1967, p.217–54.

SPENCER, CAROL C.
Subject searching with Science Citation Index: preparation of a drug bibliography using Chemical Abstracts, Index Medicus, and Science Citation Index 1961 and 1964. *American Documentation*, vol.18, no.2, April 1967, p.87–96.

STANDARD book numbering: why it is needed and how it will function. *Bookseller*, no.3205, 27th May 1967, p.2352–54, 2356, 2358–60, 2362–4.

SZANSER, A. J.
Machine translation research at the National Physical Laboratory, Teddington. *Incorporated Linguist*, vol.5, no.4, October 1966, p.102–9.

TEHNZEN, J., *and* MARTHALER, M.
Report on the first IATUL seminar on the application of international library methods and techniques, Delft, the Netherlands, 1–9 September 1966. *IATUL Proceedings*, vol.2, no.1, January 1967, p.9–29.

TING, ROBERT N.
Preprint and the physics library—a crisis and a proposal. *Sci-Tech News*, vol.21, no.1, Spring 1967, p.11–12.

VASWANI, P.
Voprosy khraneniya i poiska informatsiya [Storage and retrieval of information]. *Nauchno-Tekhnicheskaya Informatsiya,* Series 2, no.3, 1967, p.9–16.

WALL, EUGENE
A rationale for attacking information problems. *American Documentation,* vol.18, no.2, April 1967, p.97–103.

WATERS, SAMUEL T., *and* COSTABILE, SALVATORE L.
The proof of the pudding: using Library of Congress proof slips. *College and Research Libraries,* vol.28, no.2, March 1967, p.87–91.

WILKINSON, W. A.
A system for machine-assisted serials control. *Special Libraries,* vol.58, no.3, March 1967, p.149–53.

[WILSON, L.]
All the facts for the boardroom. Extracted from *The Director,* April 1967. Report of evidence given to the Parliamentary and Scientific Committee on storage, abstracting and retrieval of scientific and technical information.

WOOD, D. N.
Where mechanical engineers get their technical information. Copied from *The Chartered Mechanical Engineer,* vol.14, no.5, May 1967, p.212–5, 220.

WOODFORD, F. PETER
Sounder thinking through clearer writing. *Science,* vol.156, no.3776, 12th May 1967, p.743–5.

ZUNDE, PRANAS, *and* SLAMECKA, VLADIMIR
Distribution of indexing terms for maximum efficiency of information transmission. *American Documentation,* vol.18, no.2, April 1967, p.104–8.

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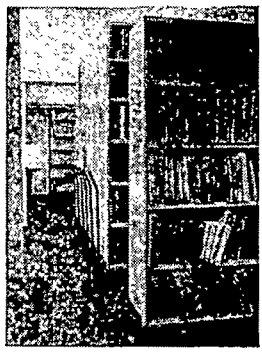

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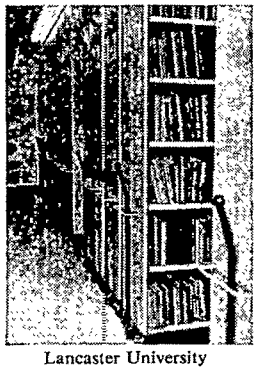

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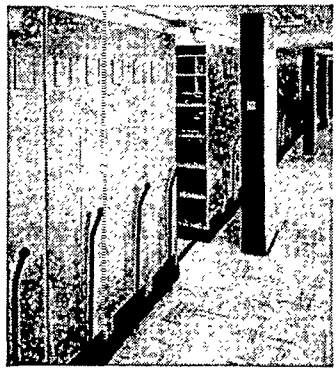

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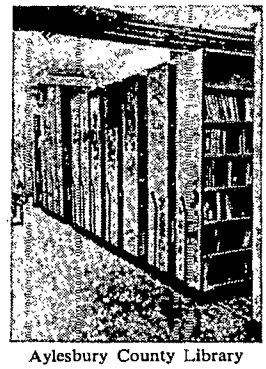

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Aslib Proc. vol.19 no.8 pp.249-285 London, August 1967

ASLIB PROCEEDINGS

incorporating Aslib Information

Volume 19 **August 1967** **Number 8**

CALCUTTA UNIVERSITY CENTRAL LIBRARY

ASLIB CALENDAR 1967

September

WED.13.	Transport Group visit to the Cement and Concrete Association Research Station, Wexham Springs, Slough.
TUE.26 – FRI.29.	Junior Introductory Course to Special Library and Information Work, Glasgow.

October

WED.4.	Technical Translation Group, 4 p.m. 'Teaching technical translation.'
MON.9. – THU.12.	41st Annual Conference at Harrogate.
TUE.17 – FRI.20.	Junior Introductory Course to Special Library and Information Work, London.
TUE.17.	Course on Handling Soviet and East European Materials begins. See paragraph below.
WED.25.	Engineering Group evening meeting. 5 for 5.30 p.m. See paragraph below.
THU.26.	Evening meeting.

November

THU.2.	Transport Group one-day conference on transport statistics at the Society of Motor Manufacturers and Traders Ltd.
WED.8.	Joint evening meeting with BSI Standards Associates' Section. 'Standards information—what you need and where to get it,' by R. L. Collison.
WED.22.	Evening meeting.
THU.23.	Technical Translation Group, 5 p.m. 'Technical interpreting as an interesting sideline.'

December

WED.20.	Aslib Christmas Party.

Programme for future Aslib Meetings and Conferences

From time to time in the past, members have made suggestions for subjects which they would like to see included in the programme of Aslib meetings and conference. This kind of co-operation is very helpful and it is much hoped that in the future still more members will come forward with requests for specific subjects for programmes. These are welcome at any time, but most of all in the early autumn, when the committees are beginning their work for the new season.

Suggestions should be made in writing and addressed to Aslib for the attention of the Meetings Organizer.

Junior Introductory Course

In our last issue, the dates of the Junior Introductory Course to Special Library and Information Work to be held in London in October were wrongly given as 16th to 19th October. The correct dates, which were given on the leaflet distributed with the same issue, are 17th to 20th October. The dates for the course to be held in Glasgow were correct.

Chemical Group

IBM are to hold a three-day course in the week beginning 23rd October entitled 'Introduction to Data Processing'. The course has not been held before and ten of the thirty places have been allocated to members of the Chemical Group. There is no charge for the course, which will take place in London. Interested members are invited to write to the Group Secretary, Mr B. T. Stern, BIP Chemicals Ltd, Popes Lane, Oldbury, Birmingham, to reserve a place—first come, first served.

During November it is hoped to hold a one-day Group Conference on case studies of computer applications in library work.

Engineering Group

A meeting of the Engineering Group to be held at 5 for 5.30 p.m. on Wednesday 25th October will concern 'The contribution of the information officer to company-wide information systems'. The meeting is intended to appeal to all members of Aslib, and should give them an opportunity to air their views on the subject. Mrs K. Bourton, information officer of CJB Construction, will introduce the subject.

It is intended that a fourth meeting should be held, based on discussion at this meeting, to cover a wider audience—including management.

Library Services in Higher Education

The Society for Research into Higher Education is holding a conference on research into library services in higher education in London on Friday 3rd November 1967. Six speakers have agreed to present papers on topics relating to current and proposed research. Full details are available from the Secretary, SRHE, 2 Woburn Square, London WC1.

Part-time Classes in Librarianship

West London College have announced their plans for part-time classes for the L.A. examinations for the academic year 1967–8. There will be a two-year course leading to the Part I examination. Among the papers in the Part II examination for which classes will be available are in List A: Special Libraries and Information Bureaux, and in List B, Theory of Classification, Theory of Cataloguing, Practical Classification and Cataloguing, and Bibliography. In List C the only subjects for which classes are arranged are Bibliography of Literature for Children, and Bibliography of Music, but tuition for other List C subjects can be arranged on an individual basis. There will also be a revision course for the Entrance Examination in November 1967. Entry will be limited to students eligible to sit for the examinations. Many of the classes are held in the evenings, but most courses involve some attendance during afternoons. The term begins on Monday 11th September 1967. Classes will be held at the West Kensington Branch, Greyhound Road, W14.

Course on Handling Soviet and East European Materials

The course on handling Soviet and East European materials will be held at Aslib again after an interval of two years. This course is intended for librarians and information workers with no knowledge of Russian who need to handle publications from the Soviet Union and other East European countries in the course of their work. It will enable students to become familiar with the Cyrillic alphabet, to transliterate, to recognize the more common Russian bibliographic terms and scientific words and to identify other East European languages. The course also covers the organizations of publishing and bibliography in the Soviet Union, and sources of supply of Russian materials in Great Britain. A visit to the National Reference Library of Science and Invention (Holborn Division) to study the treatment of such materials in a large library is included. The lecturer will again be Mrs Judith Collins, who was formerly in charge of the Commonwealth Index of Translations and the Register of Specialist Translators in the Aslib Information Department. The lectures will he held from 6.30 to 8 p.m. on Tuesday evenings from 17th October to 12th December 1967. The fee for the course will be eight guineas. A programme is enclosed in this issue, and applications should be made on the form contained in it.

If there is sufficient evidence of demand, it is hoped to run this course at some later time as a full-time course lasting two or three days, possibly at a centre in the provinces. Any students interested in attending such a course should inform the Education Officer.

Information Business Studies

Towards the end of 1966 the Social Science Research Council, in co-operation with OSTI, set up an ad hoc committee on the problem of information services for the rapidly growing field of business studies. As a result of the committee's discussions OSTI has recently awarded two grants in this field. The first (£5,385 over two years) has been made to K. D. C. Vernon, Librarian of the

London Graduate School of Business Studies, for the development of a classification scheme covering the whole field of business studies and using the principles of facet analysis. The classification will also be developed into a thesaurus of terms for co-ordinate indexing and both classification and thesaurus will be made freely available to all potential users.

The second grant (£5,000 over two years) has been made to J. D. Dews, Librarian of the Manchester Business School, who is to conduct a thorough survey of information and documentation needs in business studies and a complementary study of documentation services available to workers in both academic institutions and industrial companies. Parallel with these broad studies, a deeper investigation will be made into the information needs of a research group at the School's Centre for Business Research.

In order to ensure that the two projects are well co-ordinated and that interested organizations are represented, OSTI intends to set up a Business Studies Information Panel, which will in turn be represented on OSTI's Social Sciences Information Co-ordinating Committee.

Documentation Processing Centre for Manchester

OSTI (Office for Scientific and Technical Information) has announced that it will set up a Documentation Processing Centre as soon as possible, thus providing, as part of its own organization, a central processing facility for experimental information work, including OSTI-financed experiments that involve the use of computers. The centre will be located at Manchester, and will work in close co-operation with the National Computing Centre. The first appointments will soon be made.

The new Centre, when fully established, will have available a wide range of input, processing and output equipment, and will undertake projects involving computer-controlled composition of texts, processing of material for bibliographical services and retrieval systems, storage and manipulation of numerical data, and the application of computer techniques to library routines, such as cataloguing. It will contribute to research, particularly on the design, development and evaluation of computer programmes, on processing operations and on graphic presentation of output. It will also contribute to the development of standards in mechanized documentation and so provide greater compatibility between the programs and materials produced by different projects.

Reprints

Many readers who are also members of the Library Association will be familiar with the regular column of 'Notes on out-of-print books' in the *Library Association Record*. This records the successes and disappointments of much reprint negotiation, including classic and standard titles appearing in the Portway Reprints of the London and Home Counties Branch of the Library Association.

Following discussion with SCONUL representatives, the Library Association has now agreed to promote a new series of *LA Academic Reprints*. These will be small editions of two hundred to two hundred and fifty copies and they will

be published in a similar manner to the Portway Reprints. Cedric Chivers, Ltd, of Bath have already negotiated the first five titles to appear in the new series; these are:

A. M. Cameron: *Chemistry in relation to fire risk and fire extinction*;
Elizabeth D'Oyley: *James Duke of Monmouth*;
Henry Hunt: *Memoirs* (three vols);
William Rees: *South Wales and the March*;
E. Straker: *Wealdon Iron.*

With the co-operation of Mr Filon, it is now possible to record some of the out-of-print academic literature for which there may be a general demand. Libraries should report such books to the National Central Library on 5 in. by 3 in. cards, one card per book. Information given on each card should be author's names in full, title, publisher, the date when the notifying librarian checked with the *publisher* that the book was out of print, and the name of the library. Mr Filon will list such books in his *Occasional Newsletters,* as being under consideration for reprinting, and recipient libraries will therefore be able to reply, indicating which of the books they would want if reprinted.

Mr Norman Tomlinson will also be pleased to receive any suggestions from libraries. His address is: Central Library, High Street, Gillingham, Kent.

Translations and Translators

New publications concerning translations and translators are rare, although it is understood that Crosby Lockwood has a directory in preparation. However, in the past month four such items have been received at Aslib. The first three all concern translators:

FLEGON, A. *comp.*
Who's Who in translating and interpreting.
London, Flegon Press, 1967. 190 p. (unpriced).

POND, B. *ed.*
Internation directory of translators and interpreters.
London, Pond Press, 1967. 298 p. 80*s.*

INSDOC
Roster of Indian scientific and technical translators.
New Delhi, INSDOC, 1967. 77 p.

The Flegon publication has neither introduction nor explanation. Translators are listed alphabetically under languages, but there are not, as a rule, multiple entries where several languages are offered; qualifications, experience, occupation and special subjects are given.

The second list, edited by B. Pond, is much more comprehensive. It is printed throughout in English, French and German, and gives the addresses of international and national associations of translators and interpreters as well as information about individuals. Translators are listed under the subject in which they claim special knowledge. This directory aims to be a preliminary guide to translation services throughout the world, and recommends that a new service should be tested for quality before important work is entrusted to it.

The *Roster of Indian scientific and technical translators* will be of limited use in this country, but provides a location index to translators in India both by language and subject. It is stated that the translators listed are such by virtue of their experience and/or qualifications. There is also a section dealing with Indian languages which might be of use in Great Britain.

The remaining publication lists translations only. It is the first issue of a quarterly, self-cumulating *World Index of Scientific Translations*. Published by the European Translations Centre, Delft, it aims to provide an aid to the quick location of existing translations. Only translations from Russian, East European, Chinese and Japanese into Western Languages are listed, both individual journal articles and cover-to-cover periodicals being included.

The *World Index* is a source index. It cumulates the lists of translation notifications, issued approximately monthly which started in October 1966 under the title *List of translations notified to ETC (not previously announced in National Bulletins)*, which is arranged under subjects. It also repeats the source references, distributing organizations, and prices, from several other regular lists of available translations.

This attempt at a comprehensive list of translations offered for sale is a reflection of the current interest in improving the dissemination of translated technical literature. It complements rather than replaces the type of index exemplified by that at Aslib, which is designed to prevent duplication before it can occur by registering unpublished translations, particularly at the announcement stage.

Library Assistants' Certificate Course

Ewell County Technical College is proposing to hold a course to prepare students for the City and Guilds of London Institute Library Assistants' Certificate during the next session. The course will begin in September 1967, to prepare students for the examination held in December 1968. It will be held on Wednesday afternoons from 2 to 5 p.m. A large number of lecturers from outside the college will take part so as to give students experience of work in different types of libraries.

Birthday Honours

We are pleased to note that Dr M. Goyer, of the Rocket Propulsion Establishment, Westcott, has been awarded the MBE. She is well known to many Aslib members as Honorary Secretary of the Technical Translations Group from its beginning until 1963, and for her work as editor of the *Technical Translation Bulletin* for may years.

THE NEXT HUNDRED WEEKS IN CHEMICAL INFORMATION*

DR. G. A. SOMERFIELD

Office for Scientific and Technical Information

Chemical Group, Wednesday 8th March 1967

CHEMISTRY is an extremely wide subject, which is difficult to cover completely in a short talk. I intend, therefore, to describe some of the projects that OSTI is supporting to illustrate their likely effect on chemical information in general.

In conjunction with the Chemical Society, we are supporting an Information Retrieval and Dissemination Research Unit at Nottingham University under Dr A. Kent. Since last August it has reprogrammed the *Chemical Titles* (CT) and *Chemical-Biological Activities* (CBAC) services from Chemical Abstracts Service for the British KDF 9 computer, and outputs from the first two or three issues of CBAC and CT have already been distributed to users. This unit, in collaboration with OSTI, is also taking part in the selective dissemination of information (SDI) experiment which is being organized on a world-wide, collaborative basis by Chemical Abstracts Service. This experiment marks the first step towards the *Chemical Abstracts* of the 1970s. The service provided will resemble CBAC, an abstracts bulletin concerned with chemical and biological activities, but will cover all aspects of chemistry. All papers in thirty-two chemical journals will be abstracted internally by CAS, and put on to magnetic tape which can be searched on titles, key words associated with the abstract, and abstract text. The print-out from the search will list the reference numbers of abstracts, and the user will be provided with a booklet containing the full abstract. Since the magnetic tapes will be flown across the Atlantic and the booklets printed in this country, a fast service will be provided, and one can see how this might develop into the *Chemical Abstracts* of the future.

A grant has also been given to the University of Leeds to set up a Specialized Information Centre (SIC) in high-temperature (>1500°C) processes. The criteria for OSTI support of specialized information centres are given in OSTI Newsletter 1/67, and we believe that these centres may act as intermediaries between information sources (including big mechanized services, e.g. *Chemical Abstracts*) and users (e.g. research and development scientists and technologists). SICs are only required when the information for a particular research or development field comes from several disciplines. In the particular case of high-temperature processes, information is required on the chemistry and physics

* This paper has been prepared from a transcript of an informal talk given to the Aslib Chemical Group. The views expressed in it are not necessarily those of the Office for Scientific and Technical Information.

of plasmas, materials which will withstand high temperatures, and the engineering construction that is needed to get those high temperatures. If this SIC functions correctly, it will draw information from sources such as the American space effort, atomic energy research, and the magneto-hydrodynamic generation of electricity, evaluate it, mark it for retrieval, perhaps by co-ordinate indexing, and then store and disseminate it to people working in this field, thus playing an important part in research carried out in Government, university and industrial laboratories during the next three years. In this period of time it should be possible to assess whether there is any economic and technological future in high-temperature processes.

The *Mass Spectrometry Bulletin* represents one form of dissemination by an SIC. Papers in mass spectrometry are selected at the Atomic Weapons Research Establishment and keywords are assigned from a small thesaurus of about 250 terms. A particularly interesting feature of this bulletin, which is being issued with OSTI's support on an experimental basis for about two or three years, is the list of compounds studied by mass spectrometry. This seems to have aroused a great deal of interest among mass spectroscopists and organic chemists. Compounds may be retrieved either by molecular weight or by a simple functional group code. The bulletin provides a deeply indexed current-awareness service, but is slow, since it takes about six weeks to select the papers, index concepts and compounds, and publish the bulletin.

SICs may operate as intermediaries between mechanized services like CT, which are working on titles alone, and the individual users. Within a given research field there might be two hundred people receiving output from more or less identical profiles, so that each scans through the same one hundred titles a week. Such duplication might be eliminated if two or three scientists with expert knowledge and associated with a research group expert in that field selected relevant papers from a few core journals and from the outputs of several mechanized information systems using broad profiles. Within about a week a list of indexed titles could be provided for use by others working in the field and the SICs would also acquire copies of all relevant papers. OSTI can offer only limited financial support for such external projects, and at present these are concentrated in the pure science field in areas of potential scientific importance.

Long term research work in chemical information supported by OSTI is concentrated with Dr M. Lynch (Sheffield University) who is working on automatic subject indexing and on the automatic detection of structural similarities in chemical compounds. A file of chemical compounds in machine-readable form can be searched by computer at the present time if the whole or part structure can be specified (e.g. 'Is this structure known?' or 'In how many compounds is this specific sub-structure contained?'). But Dr Lynch believes that to exploit fully a file of chemical compounds, containing perhaps ten thousand or more structures, it is necessary to programme the computer to answer the question 'What is the largest common structural factor between these compounds?' In this case, it is not necessary to specify any part of the substructure and the answer may be 'two carbon atoms joined together,' or even 'one carbon atom.' If analogous computer searches could be made on the activities—both physical (e.g.

melting point and spectra) and biological—of the same file of compounds, it would be possible to carry out extensive structure-activity correlations, a technique which is vital to many areas of chemical research. I hope Dr Lynch's work is successful, because we shall need this kind of programme in the 1970s to handle the amount of information that will be available on chemical compounds.

Chemical Abstracts Service, with US Government support, is developing a chemical compound registry system whereby all known compounds will be assigned a unique registry number and their structures will be available for structure and substructure searches by computer. The registry number will act as a key to all information (bibliographic details, physical constants, etc.) known about the compound. At the present time, about 500,000 compounds out of an estimated total of nearly four million have been encoded and, on a routine basis, all compounds reported in papers covered by current issues of *Chemical Abstracts* are registered.

On the technological side of chemistry, the Institution of Chemical Engineers has set up its own committee and is trying to approach the individual user of information. This committee believes that everyone should understand the concepts of present-day information activities, in order to select papers from chemical-engineering publications to which keywords may have been added, and to put them in their own personal file. This concept is obviously worth serious consideration, but it raises an important and difficult question: to what extent should individuals have their own information systems?

I have described some of the experimental approaches OSTI is supporting in an effort to find out what users of information require. We may find out if we offer experimental services, ask users to think critically about them and then to say what is acceptable and what is not. This, then, is the present situation, but what does the future hold in store?

There is no abstracting service covering all chemistry in this country and we are dependent on *Chemical Abstracts* and other abstracting services. It would not be possible for us to duplicate the great amount of work in progress at Chemical Abstracts Service,* so let us look at what they are trying to do. The work at Columbus, Ohio, is aimed at the conversion of a traditional abstracts service into a modern information service. The ultimate objective is the complete mechanization of the production of *Chemical Abstracts* to provide a data base for exploitation in any way of benefit to the user. Services like CBAC and, in the polymer field, POST, are early examples of these new services. Future plans include an Analytical Alert (covering physical techniques and analytical methods), Chemical Engineering Alert, Agricultural Chemistry Alert, and several others. These developments will raise problems of adjustment, which must be solved, for some specialized abstracting publications in this country. So that sound decisions can be made, chemists themselves must think critically about their information requirements.

A feature of the work of Chemical Abstracts Service is its dependence upon computers. The change in hardware from a second to a third generation system will enable CAS to extend the scope of its work and, in particular, to expand the chemical-compound registry system to include polymers, mixtures,

* See F. A. Tate, *Chem. & Eng. News*, 1967, p. 78, for a full description.

inorganic and co-ordinate compounds. The effects of this change in computer configuration will only be obvious in the long term, but the dependence of developments in chemical information services upon available hardware is clearly shown. It seems necessary that ideas which are impracticable now should be put into cold storage for resurrection at, say, two-yearly intervals, to see whether hardware developments have made them any more feasible.

Within the United Kingdom, I think the next two years will see much more use made of mechanized services such as CT, CBAC and POST. This use may be concentrated, due to the expense of the services, in the larger chemical companies, probably resulting in a wider gap than at present exists between the information practice in these companies and that of small industrial concerns and universities. I am sure that the only way to narrow this gap is to develop criteria on which to base the monetary value of information services to any organization, whether large or small, industrial or Government supported. The demand for information services will increase greatly in the next few years and may stimulate competition for finance between traditional services (e.g. libraries and abstracts publications) and modern (e.g. computer-based) services. Further difficulties may arise when considering the relative values of broad-based services such as *Chemical Abstracts* and specialized services.

Current awareness services, with the emphasis on speed, have been the first to be mechanized, and I have suggested that their use will probably spread during the next two years. This, however, is only one aspect of the information needs of the user, and a good retrieval service is equally important. Should this type of service be mechanized? Possibly it should in the long run, but at present there are many difficulties, particularly with broad-based information services. The cost of carrying out exhaustive literature searches on a computer is prohibitive at present; it could be reduced by batching questions, as in current awareness, but this will introduce a delay. How long will users be prepared to wait? Improvements in computer hardware and software will ease these problems, but there are also considerable problems relating to the structure of chemical information within a mechanized system. Even when multi-access computers are widely available, I believe that manual searching of printed guides prepared by the computer will form part of the retrieval process for a long time to come.

Another development which may have started in two years' time is the printing of certain overseas journals in Europe. Current awareness services using tapes flown over the Atlantic have emphasised the delay in obtaining the original article in some cases. As computer typesetting of journals becomes more widespread, it may be feasible to fly over the control tapes or print negatives to enable a short run to be carried out in Europe. However, this scheme may be uneconomic especially if a premium has to be paid for speed, e.g. to meet air freight costs. Whether such a premium might be justified can only be decided in individual cases and once again we are back to the need for sound criteria on which to base these decisions.

Increased use of mechanized services will result in the dissemination of several hundred thousand references throughout the country each week and I wonder what effect requests for unusual journals will have upon local librarians.

One consequence may be requests to centralized lending facilities for the same article, perhaps resulting in considerable delays. If this happens librarians in small, specialized libraries may wish to add to their accession lists those titles for which there is increased demand but this tendency will be limited by the resources available to them. On the other hand it may be more efficient and economic to provide improved centralized facilities, but little evidence is yet available on this aspect.

Chemists make considerable use of collections of data on physical properties of compounds, but it is becoming more difficult both to compile this material and to make it available, usually in printed form, in individual laboratories. Computer-based systems for handling this type of data are under development, but it may not be possible to decentralize such a system. As with the problem of information mentioned earlier, it seems that chemists, chemical information officers and librarians will tend to reorientate themselves to make use of centralized collections of data and information, but this type of use is likely to be carried out in conjunction with search guides produced from the mechanized system.

The possible developments I have outlined will require trained personnel to develop and then operate these systems. Steps are being taken to train such people, but I believe that in addition there is a need for research workers to accept the value and challenge of information work. I would like to see the situation emerge whereby most research workers served a short period as information scientists before returning to research work or moving on to administrative work. Some would wish to stay in information work, helping to solve the many complex problems which we face, and gradually the image of information science would improve. I hope this trend becomes more widespread during the next two years and that after that time there will be real competition for posts as information scientists. It can do nothing but good for the area in which we work.

In conclusion, I do not think that even in two years' time a clear pattern for the use of chemical information will have emerged. Some trends will be apparent, a few big developments will have started and a lot more money will be spent, mainly by the larger firms, on information services. Small firms will still tend to use traditional methods, and it will still be hard to convince them of the value of an expensive information system. I believe that the only way in which this situation will change will be for the people dealing with the information, the librarians and information officers, to try and establish the criteria on which they can go to their management and fully justify expenditure on such systems. Information services will help a company in its research, in its production, and in other ways; but this must be clearly established. This can only be done if the research scientists, in conjunction with the information officers, show how the information provided is being used and how this affects the company. When this stage has been reached, information science is on sure, safe ground.

PERIODICALS HELD IN THE ASLIB LIBRARY AS AT 15TH JULY 1967

Compiled by

YVONNE FOY, ALA

Librarian Aslib

A.C.L.S. Newsletter [American Council of Learned Societies]
1949–50, 1, 2, 4, 5; 1951, 2, 1, 2; 1952, 3, 1–4; 1953, 4, 1–4; 1954, 5, 1–4; 1955, 6, 1–4; 1956, 7, 1–4; 1957, 8, 1–5; 1958, 9, 1–3, 5–7, 9, 10; 1959, 10, 2–4, 6–8; 1960, 11, 2, 5–10; 1961, 12, 1–3, 6–10; 1962, 13 —

A.C.R.L. Monographs [Association of College and Research Libraries]
1952, 1 —

A.D.I. Newsletter [American Documentation Institute]
1955, 2–4; New series, 1962–3, 1, 4–6; 1963, 2, 1, 2; 1964, 3, 2, 3; 1965, 4, 1–5; 1966, 5, 1–4, 5; 1967, 6 —

A.I.P. Documentation Newsletter [American Institute of Physics]
1962, 3, 1, 2; 1963, 4, 1, 3; 1964, 5, 1, 2; 1965, 6; 1966, 7. *Continued as* **A.I.P. Information Program Newsletter**, q.v.

A.I.P. Information Program Newsletter (*formerly* **A.I.P. Documentation Newsletter**)
1967, 1 —

A.L.A. Bulletin [American Library Association]
1934, 28, 12; 1937, 31; 1938, 32; 1939, 33, 1–7, 9, 10, 13; 1940, 34, 1 (Pt. 1), 2–6, 8–10, 12; 1941, 35, 1–7, 9, 10, 12; 1942, 36– 1945, 39; 1946, 40, 6–13; 1947, 41, 1–8, 10–13; 1948, 42–1957, 51; 1958, 52, 1, 4–11; 1959, 53, 1–7, 9–11; 1960, 54 —

A.S.L.P. Bulletin [Association of Special Libraries of the Philippines]
1954, 1, 2–7; 1961, 7, 4

Abgila [Indian Library Association]
1949–50, 1, 1–8; 1950–52, 2, 1–5, 7, 8; 1953, 3, 1–4

Abstract Journal: Scientific and Technical Information [*Translation of* **Referativnyi Zhurnal: Nauchnaya Technicheskaya Informatsiya**]
1965, experimental issue; 1966, 4 —

The Abstractor: quarterly bulletin of the Victorian Division of the Special Libraries Section, Library Association of Australia
1958, 2, 4; 1959, 3, 1–4; 1960, 4, 1

The Abstractor. Supplements (Occasional Papers in Australian Special Librarianship)
1955–58, 1–3, 5–10

Activities [O.E.C.D.]
Current year only

Aids to readers [National Reference Library of Science and Invention]
No. 1 —

Aktualne Problemy Informacji i Documentacji [Warsaw]
1963, 8, 1–4; 1964, 9 —

American Archivist
1957, 20 —

American Council of Learned Societies Bulletin (containing proceedings of annual meetings)
1950–57, 43–45, 47–50

American Documentation
1950, 1, 1 —

Analyses Documentaires [Union Française des Organismes de Documentation]
1960, 1, 1–4

Annals of Library Science and Documentation [Delhi]
1954, 1– 1964, 11; 1966, 13 —

Archives: journal of the British Records Association
1949, 1 —

Arclight Review
1956, 19; 1957, 20; 1958, 21, 1–10; 1959, 22, 1–5, 7–12; 1960, 23; 1961, 24, 1, 3–12; 1962, 25. *Continued as* **Mason International**, q.v.

Aslib Booklist
Current and preceding years only

Aslib Information
1929–56, 1–193. *Continued in* **Aslib Proceedings**, q.v.

Aslib Proceedings (*Incorporating* **Aslib Information** from 1957)
1949, 1 —

Aspects of Librarianship [Kent State University, Ohio]
1952–60, 1–25

Assistant Librarian
1946, 39, 5, 6; 1947, 40–1950, 43; 1951, 44, 1, 2, 5–10; 1952, 45–1958, 51; 1959, 52, 1–3, 5–12; 1960, 53 —

Atlantic Provinces Library Association Bulletin (*continuation of* **Maritime Library Association Bulletin**)
1958–59, 23, 1; 1959–60, 24, 1–4; 1960–61, 25, 1–4; 1961–62, 26, 1–5; 1963, 27, 1, 3, 4; 1964–65, 28, 1–4; 1965, 29, 1

Australian Library Journal
1951–52, 1, 1–6; 1953, 2, 1–4; 1954, 3, 2–4; 1955, 4; 1956, 5; 1957–58, 6, 1–5; 1958, 7, 2–4; 1959, 8, 1, 2, 4; 1960, 9; 1961, 10; 1962, 11, 1–3; 1963, 12 —

Author [Society of Authors]
1948–49, 59, 3, 4; 1949–50, 60; 1950–51, 61; 1951–52, 62, 1, 2, 4; 1952–53, 63 —

B.S.I. News [British Standards Institution]
Current year only

B.S.I. Overseas & Commonwealth Standards [British Standards Institution]
Current year only

Babel: international journal of translation
1955, 1 —

Bibliographica Belgica
1953–65, 3, 4, 6–9, 13, 14, 19, 21, 22–31, 33, 37–61, 67, 68, 78, 85

Bibliographical News (*continuation of* **Bibliographical Newsletter**)
1958, 7–1961, 10, 1. *Continued in* **Bibliography, Documentation, Terminology,** q.v.

Bibliographical Newsletter [UNESCO]
1952, 1–1957, 6. *Continued as* **Bibliographical News,** q.v.

Bibliographische Mitteilungen zum Bibliothekswesen [Berlin]
1958, 1–6; 1962, 1; 1963, 1–5

Bibliography, Documentation, Terminology (*Incorporating* **Bibliographical News** *and* **Monthly Bulletin on Scientific Documentation and Terminology**)
1961, 1 —

Biblioteche Speziali e Servizi d'Informazione [Associazione Italiana Biblioteche]
1963 —

Bibliotekar [Moscow]
1952; 1953, 8–12; 1954, 7–12; 1955; 1956, 2–12; 1957, 7–12; 1958; 1959, 1–3, 5–12; 1960; 1961, 1–4, 7–10, 12; 1962–64; 1965, 1–4; 1966 —

Bibliotekar [Sofia]
1955, 2, 1–6, 8–12; 1956, 3, 1–10; 1957, 4–1960, 7; 1961, 8, 1–3, 5–12; 1962, 9–1964, 11; 1965, 12, 1–10, 12; 1966, 13 —

Bibliotekovedinie i Bibliografiya [Moscow]
1959, 1–3; 1960, 1, 3; 1961, 2; 1962, 2–4; 1963 —

Biblioteksbladet [Lund]
1952, 37, 8; 1953, 38, 1–7, 9, 10; 1954, 39, 1–10; 1955, 40, 2–10; 1956, 41, 1–9; 1957, 42–1964, 49; 1965, 50, 1–9; 1966, 51 —

Biblioteky SSSR
1962, 21 —

Bibliotheekleven [Amsterdam]
1952, 37, 7; 1954, 39, 10–12; 1955, 40–1957, 42; 1958, 43, 1–7, 10–12; 1959, 44, 1–4, 6–8, 10; 1960, 45, 12; 1963, 48, 10

Biblos: monthly report of special libraries (Branch Libraries Division, National Diet Library, Japan)
1953, 4; 1954, 5, 1–3, 7–12; 1955, 6, 1–4.

Biblos: Oesterreichische Zeitschrift für Buch- und Bibliothekswesen, Dokumentation und Bibliophilie
1952, 1, 3, 4; 1953, 2–1962, 11; 1963, 12, 1–3; 1964, 13 —

Biuletyn Instytutu Bibliograficznego [Warsaw]
1951–53, 3, 4, 7–9; 1953–55, 4, 1, 2, 5–9; 1956–57, 5, 1–4; 1957–58, 6, 1–3

Bliss Classification Bulletin
1954–55, 1, 1–3; 1957, 2, 1; 1964, 3 —

Bollettino d'Informazioni [Associazione Italiana Biblioteche]
1963, 3, 1; 1964, 4 —

Bollettino d'Informazione sulla Microriproduzione
1953, 1–1960, 8

Book Design and Production
1958–59, 1–1961, 4; 1962, 5, 1, 3, 4; 1963, 6, 1–3; 1964, 7, 1–3. *Continued in* **Print Design and Production**

Books: the journal of the National Book League
1944, 183; 1945, 187–190, 192–195; 1946–57, 197–313; 1958–63, 315–349; 1964, 351 —

Books and Publishing [Boston, Mass.]
1953–54, 1; 1956, 3

Bookseller
Current year only

British Book News [British Council]
1941–46; 1947, 78–88; 1948; 1949, 101–111; 1950, 113–118, 120–124; 1951–53; 1954, 161–168, 170–172; 1955; 1956, 186–196; 1957, 197–200, 203–208; 1958, 209, 210, 212–220; 1959–62; 1963, 269–270, 274–280; 1964, 281, 282, 284–292; 1965 —

Bulletin of ABTAPL [Association of British Theological and Philosophical Libraries]
1957, 2; 1958, 5 —

Bulletin de l'Association Internationale des Documentalistes et Techniciens de l'Information
1962, 1, 1; 1963, 2; 1964, 3; 1965, 4, 1–3; 1965, 5. (*Ceased publication.*)

Bulletin des Bibliothèques de France (*Incorporating* **Bulletin d'Informations de la Direction des Bibliothèques de France** *and* **Bulletin de Documentation Bibliographique**)
1956, 1, 1–3, 5–12; 1957, 2; 1958, 3, 1, 3–12; 1959, 4, 1, 2, 4–12; 1960, 5–1964, 9; 1965, 10, 2–12; 1966, 11 —

Bulletin of the British Institute of Recorded Sound
1956–58, 1–10; 1959–60, 14–18. *Continued as* **Recorded Sound,** q.v.

Bulletin of the Business Archives Council of Australia (N.S.W. and Victorian Branches)
1961, 1, 5–9.

Bulletin du Cimab [Centre d'Information du Matériel et des Articles de Bureau]
1966, 7; 1967, 4 —

Bulletin de la Commission Belge de Bibliographie
1957, 1, 1–4; 1958, 2–1960, 4; 1961, 5, 1, 2/3; 1962, 6 —

Bulletin de Documentation Bibliographique
1939, 6, 1–9; 1940, 7, 1–9; 1941, 8, 1–9; 1942, 9, 1–3, 5–9; 1943, 10, 1–9; 1944, 11, 1–8; 1945, 12, 1–3, 7–9; 1946, 13, 1–8; 1947, 14, 1–8; 1948, 15, 1–8; 1949, 16, 1–7; 1950, 17, 3–8; 1951, 18, 1–7; 1952, 19, 1–8; 1953, 20, 1–8; 1954, 21, 1–8; 1955, 22, 1–6. *Continued in* **Bulletin des Bibliothèques de France,** q.v.

Bulletin d'Information [Association Internationale des Bibliothèques Musicales]
1953, 2, 2

Bulletin d'Informations de la Direction des Bibliothèques de France
1954, 3– 1955, 4. *Continued in* **Bulletin des Bibliothèques de France,** q.v.

Bulletin de l'Institut International de Bibliographie
1897, 2, 4–6; 1898, 3, 5–6; 1899, 4; 1900, 5, 3–6; 1901, 6–1906, 11; 1908, 13, 6; 1909, 14–1911, 16; 1914, 19. *Ceased publication. See also* **Documentatio Universalis**

Bulletin of the Institute of Information Scientists
1962, 2, 1, 2; 1964, 3, 1, 2; 1965, 4– 1966, 5. *Continued as* **The Information Scientist,** q.v.

Bulletin of the Medical Library Association
1953, 41–1961, 49; 1962, 50, 1, 2, 4; index 41–50; 1963, 51 —

Bulletin of the New York Public Library
1946, 50, 1–4; 1948, 52–1953, 57; 1955, 59–1963, 67; 1964, 68, 1–7, 9; 1965, 69; 1966, 70, 1–3

Bulletin of the Provisional International Computation Centre [Rome]
1959–62, 4–16. *Continued as* **ICC Bulletin,** q.v.

Bulletins of the National Archives [United States]
1943, 5; 1944, 6; 1952, 7

Business Equipment Digest
1961, 1 —

Business History [Liverpool]
1958–59, 1 —

C.L.R. Recent Developments [Council on Library Resources]
Current year only

Cadernos de Biblioteconomia [Coimbra]
1966, 3 —

Cadig Newsletter [Coventry and District Information Group]
1964, 1, 1 —

Cahiers de la Documentation [Association Belge de Documentation]
1947, 1, 1–8; 1948, 2–1950, 4; 1951, 5, 2–11; 1952, 6–1957–58, 11; 1958–59, 12, 1–4, 7–10; 1959–60, 13–1962, 15; 1963, 17, 1–6; 1965, 19 —

California Librarian
1953, 15, 2; 1965, 26 —

Canadian Library: bulletin of the Canadian Library Association
1950, 6, 4; 1952–53, 9, 1, 2 (part 1), 3, 4, 6; 1953–54, 10–1958–59, 15; 1959–60, 16, 1–4, 6; 1960–61, 17; 1961–62, 18; 1962–63, 19, 1–5, 6 (part 1); 1963–64, 20 —

Cataloging Service Bulletin [Library of Congress]
1950, 22–1962, 57; 1963, 59–1964, 64; 1964, 66–1965, 73; 1966, 75 —

Catalogue and Index: periodical of the Library Association Cataloguing and Indexing Group
1966, 1 —

Chemical Literature [American Chemical Society]
1953, 5, 3, 4; 1954, 6, 3, 4; 1955, 7– 1960, 12; 1961, 13, 2–4; 1962, 14; 1963, 15; 1964, 16, 1–3

Classification Society Bulletin [Leicester University]
1965, 1, 1 —

College and Research Libraries [American Library Association]
1939–40, 1, 1, 2; 1940–41, 2; 1941–42, 3, 1–3; 1942–43, 4, 1, 3, 4; 1943–44, 5; 1944–45, 6, 1, 3, 4 (part 2); 1945–46, 7, 3, 4; 1947, 8 —

Communications of the Association for Computing Machinery
1959, 2, 1, 6, 9, 10; 1960, 3, 1, 3; 1961, 4, 10; 1962, 5–1965, 8; 1966, 9, 2–12; 1967, 10 —

Computer Bulletin [British Computer Society]
1957–58, 1–1959, 3; 1960–61, 4, 1, 2 (suppl. only), 3, 4; 1961–62, 5–1963–64, 7; 1964–65, 8, 1, 2, 4; 1965–66, 9, 1, 3, 4; 1966–67, 10 —

Computer Journal [British Computer Society]
1958–59, 1, 1, 2, 4; 1959–60, 2– 1963–64, 6; 1964–65, 7, 1, 2, 4; 1965–66, 8 —

Computer News [Technical Information Company, St. Helier, Jersey]
1964, 8, 1–7, 9, 11, 12; 1965, 9, 1–8, 10; 1966, 10, 1–4, 6–12; 1967, 11, 1 —

Computer Weekly
1966, 1, 2 —

Computing Reviews [Association for Computing Machinery]
1961, 2–1963, 4; 1964, 5, 1, 2, 4–6; 1965, 6 —

Copyright: monthly information bulletin for the members of the Copyright Club
1963–64, Dec./Jan.; 1964, Feb.–Sept., Dec.; 1965 —

DK-Mitteilungen [Deutscher Normenausschuss]
1956, 1, 1; 1966, 11 —

Data Processing (*continuation of* **Punched Card Data Processing**)
1960, 2, 1–3, 6–11; 1961, 3; 1962, 4. *Continued as* **Data Processing for Management**, q.v.

Data Processing and Microfilming Systems
1960, 1, 1, 2. *Continued as* **Systems Management**, q.v.

Data Processing Digest
1955, 1, 8; 1956, 2, 2–12; 1957, 3–1961, 7; 1962, 8, 1–11; 1963, 9 —

Data Processing for Management (*continuation of* **Data Processing**)
1963, 5, 1–11; 1964, 6, 3–6. *Incorporated in* **Data Processing Magazine**, q.v.

Data Processing for Science/Engineering
1963, 1, 1, 2; 1964, 2, 1, 2. *From July* 1964, *incorporated in* **Data Processing Magazine**, q.v.

Data Processing for Top Management and Chief Executives
1959, 1 —

Data Processing Magazine (*incorporating* **Data Processing for Management** *and* **Data Processing for Science/Engineering**)
1964, 6, 7–10; 1966, 8, 4, 7–9

Datamation
1967, 13 —

Digital Computer Newsletter [U.S. Office of Naval Research]
1965, 17 —

Documentatio Universalis: bulletin de l'Institut International de Documentation
1931–32, 1–8. *Ceased publication. Continued from* 1934 *as* **I.I.D. Communicationes**, q.v.

Documentation Abstracts
1966, 1, 1 —

Documentation en France [Union Française des Organismes de Documentation]
1953, 21–1957, 25; 1958, 26, 1, 4–6; 1959, 27, 1–4, 6; 1960, 28–1962, 30; 1963, 31, 1–3; 1964, 32, 4–6; 1965, 33 —

Dokumentation: Zeitschrift für Theorie und Praxis der Dokumentation und Informationsarbeit
1954, 1, 4–9; 1955, 2–1959, 6; 1960, 7, 1, 3–6; 1961, 8–1964, 11. *Continued as* **ZIID-Zeitschrift**, q.v.

Dokumentation Fachbibliothek Werksbücherei: Zeitschrift für technische Archive
1954–55, 3–1958–59, 7; 1959–60, 8, 1–5; 1960–61, 9; 1961–62, 10, 2–6; 1962–63, 11, 1, 3–6; 1963–64, 12 —

Dokumentation in Medizin und Biologie
1958, 2, 3; 1959, 3, 1–4. *Continued as* **Medical Documentation**, q.v.

Drexel Library Quarterly
1965, 1 —

E.D.P. Information Bulletin [National Cash Register Co.]
1966, 5 —

Eastern Librarian [East Pakistan Library Association]
1966, 1, 1 —

Education Libraries Bulletin [Institute of Education, University of London]
1958, 1 —

Education Today
Current year only

Electrical Translators' Bulletin
1955–56, 1, 1–3; 1956, 2, 1; 1957, 3, 1–3; 1958, 4, 1–3. *Continued as* **Engineering Translators' Bulletin**, q.v.

Engineering Translators' Bulletin (*continuation of* **Electrical Translators' Bulletin**)
1959, 5, 1–3; 1960, 6, 1, 2. *Continued as* **Technical Translation Bulletin**, q.v.

Express Information of Foreign Literature on Library Science and Documentation [Budapest]
1965, 1–12; 1966, 1–4, 6–12; 1967, 1 —

Express Information of Hungarian Literature on Library Science and Documentation
1965, 1–9; 1967 —

Eye to Eye: bulletin of the Graphic History Society of America
1953–56, 1–8

F.I.D. Communicationes [Fédération Internationale de Documentation] (*continuation of* **I.I.D. Communicationes**)
1939, 6–1946, 13. *Continued as* **Revue de la Documentation**, q.v.

F.I.D. Informations
1951, 1–1955, 5, 2. *Continued as* **Informations F.I.D.**, q.v.

F.I.D. News Bulletin (*continuation of* **Informations F.I.D.**)
1960, 10, 1, 2, 4, 6–8, 10–12; 1961, 11, 1–3, 5–8, 11, 12; 1962, 12, 1–6, 8, 9, 11, 12; 1963, 13 —

Fair Newsletter [National Institute for Medical Research]
1966, 1 —

Farmington Plan Letter
1949–62, 1–17. *Continued as* **Farmington Plan Newsletter,** q.v.

Farmington Plan Newsletter (*formerly* **Farmington Plan Letter**)
1963, 18 —

Finite String: newsletter of the Association for Machine Translation and Computational Linguistics
1964, 1, 1, 2, 7

Fontes Artis Musicae [Association Internationale des Bibliothèques Musicales]
1954, 1, 1, index; 1955, 2, 1, index; 1956, 3, 1, index; 1958, 5, 2, index; 1959, 6, 1, index; 1960, 7, 1, 2, index; 1961, 8, 1, 2, index; 1962, 9, 1, 2, index

Foreign Developments in Information Processing and Machine Translation (*Continuation of* **Soviet Developments in Information Processing and Machine Translation**)
1960, 1–3. *Continued as* **Foreign Developments in Machine Translation and Information Processing,** q.v.

Foreign Developments in Machine Translation and Information Processing (*continuation of* **Foreign Developments in Information Processing and Machine Translation**)
1960–62, 4, 6–13, 15–17, 19–21, 23–34, 36–46, 48–81, 83–111; 1963, 112–149; 1964, 150–153, 159–163

Gaceta Bibliotecaria del Peru
1963, 1–4; 1964, 7, 8; 1965, 9 —

Gazette: international journal for mass communication
1956, 2 —

Graphic Arts Progress
1954, 1; 1955, 2, 1, 3–6; 1956, 3; 1957, 4; 1958, 5, 1, 2, 4–6; 1959, 6, 1–5; 1960, 7; 1961, 8, 3, 6; 1962, 9, 2–6; 1963, 10, 1, 3–6; 1964, 11 —

Harvard Library Bulletin
1950, 4–1960, 14; 1967, 15 —

Herald of Library Science [Varanasi, India]
1962, 1 —

I.A.M.C.R. Bulletin: quarterly published by the International Association for Mass Communication Research in co-operation with the international journal **Gazette**)
1962, 1, 2; 1963; 1964

I.B.M. Journal of Research and Development
1957, 1, 1, 2, 4; 1958, 2–1961, 5; 1962, 6, 1, 2, 4; 1963, 7 —

I.B.M. Nachrichten
1957, 131–1961, 153; 1962, 155–1965, 173; 1966, 176, 177, 180; 1967, 181 —

I.C.C. Bulletin (*formerly* **Bulletin of the Provisional International Computation Centre**)
1962, 1, 1–3; 1963, 2 —

I.C.C. Newsletter [International Computation Centre]
1963–65, 1–22, 26–31; 1966 —

I.C.T. Data Processing Journal
[1963–64?], 7, 13–15, 17, 18; index 13–18

I.F.L.A. News Bulletin [International Federation of Library Associations]
1962, 1 —

I.I.D. Communicationes [Institut International de Documentation] (*continuation of* **Documentatio Universalis**)
1934, 1–1938, 5. *Continued as* **F.I.D. Communicationes,** q.v.

Iaslic Bulletin [Indian Association of Special Libraries and Information Centres]
1956, 1, 2; 1957, 2, 1–2; 1958, 3, 1–3; 1959, 4, 1–2, 4; 1960, 5, 1–2, 4; 1961, 6, 1–3; 1962, 7 —

Iatul Newsletter [International Association of Technological University Libraries]
1963, 3, 4; 1964, 5, 6, 7; 1965, 8, 10, 11. *Continued as* **Iatul Proceedings,** q.v.

Iatul Proceedings (*formerly* **Iatul Newsletter**)
1966, 1 —

Illinois Libraries
1956, 38, 7–10; 1957, 39 —

The Incorporated Linguist
1962, 1, 2–4; 1963, 2; 1964, 3, 1, 2; 1965, 4, 2–4; 1966, 5, 1, 2, 4; 1967, 6 —

Index to Theses Accepted for Higher Degrees in the Universities of G.E. and N. Ireland [Aslib]
1950–51, 1 —

The Indexer [Society of Indexers]
1958, 1 —

Indian Librarian
1947, 1, 4; 1947–48, 2, 2–4; 1948–49, 3; 1949–50, 4; 1950–51, 5, 1, 2, 4; 1951–52, 6–1956–57, 11; 1957–58, 12, 1; 1958–59, 13 —

Indo-Pacific Exchange Newsletter (National Diet Library, Japan)
1960, 8, 9. *Continued as* **National Diet Library Newsletter,** q.v.

Industrial Editor
1954–58, 2, 1–5

Information: journal of the Association of Special Libraries and Information Services [Australia]
1947, 1, 1, 2; 1948, 2, 1, 2; 1949–50, 3, 1, 2; 1950–51, 4, 1, 2.

Information Retrieval Letter [American Data Processing, Inc.]
1965–66, 2–12; 1966–67 —

Information Scientist: journal of the Institute of Information Scientists (*formerly* **Bulletin of the Institute of Information Scientists**)
1967, 1 —

Information Storage and Retrieval
1963, 1 —

Informations Eurafdoc [Union Eurafricaine de Documentation]
1960, 1, 1–12; 1961, 2, 1–5

Informations F.I.D. (*continuation of* **F.I.D. Informations**)
1955, 5, 3–5, 7–10, 12; 1956, 6–1958, 8; 1959, 9, 1–8, 10–12. *Continued as* **F.I.D. News Bulletin**, q.v.

Informations U.F.O.D. [Union Française des Organismes de Documentation]
1956, 26; 1957, 27, 28; 1958, 29, 32, 33; 1959, 34–37; n.s. 1960, 7, 8–12; 1961, 8, 1–7, 11, 12; 1962, 9; 1963, 10; 1964, 11, 1–6

Inspel: international newsletter of special libraries [IFLA]
1966, 1 —

International Business Equipment
Current year only

International Conference on Cataloguing Principles Newsletter [IFLA]
1965, 1 —

International Librarian and Information Services [Tokyo]
1955, 1, 1–3; 1956, 2, 1–9

Islic Bulletin [Israel Society of Special Libraries and Information Centres]
1966, 1 —

Items [Social Science Research Council, New York]
Current year only

Japan. National Diet Library Information Bulletin (English Version))
1953, 5, 11, 12. *Continued as* **Japan. National Diet Library Official Bulletin**, q.v.

Japan. National Diet Library Official Bulletin (English version) (*continuation of* **Japan. National Diet Library Information Bulletin** (English version)
1954–55, 6, 1–3; 1956, 7, 1–4

Journal of the Association for Computing Machinery
1964, 11; index 1954–63, 1–10

Journal of Cataloguing and Classification
1950, 6, pp 40–50; 1952, 8, 3; 1953, 9, 1–3; 1954, 10–1956, 12. *Continued in* **Library Resources and Technical Services**, q.v.

Journal of Chemical Documentation
1961, 1 —

Journal of Chemical Education
1952, 29–1954, 31; 1955, 32, 1–9; 1956, 33, 6–12; 1957, 34; 1958, 35; 1959, 36, 3–7, 9–12; 1960, 37, 1–6, 8–12; 1961, 38, 2–12; 1962, 39; 1963, 40, 2–12; 1964, 41, 1–3

Journal of Documentary Reproduction
1938, 1, 1, 2; 1939, 2; 1940, 3, 3; 1941, 4; 1942, 5. *Ceased publication*

Journal of Documentation
1945, 1 —

Journal of Education for Librarianship
1960, 1 —

Journal of the Indian Library Association
1956, 1, 3, 4, special number; 1956–57, 2, 1, 2

Journal of Library History
1966, 1 —

Journal of the Society of Archivists
1955–59, 1, 2–7, 9, 10; 1960, 2 —

Journal of the Technical Publications Association
1957–61, 1, 1, 3–6

Kirjastolehti [Helsinki]
1954, 8, 10; 1955–60; 1961, 1, 2, 4–10; 1962 —

Konyvtari es Dokumentacios Szakirodalom (Literature Section of **Konyvtari Figyelo**) [Budapest]
1962, 1–10; 1963, 1–6; 1964, 1–2

Korte Mededeelingen [Nederlandsch Instituut voor Efficiency *and* NIDER]
1934, 4, May; 1935, 5, July/Aug.; 1936, 6; 1937, 7; 1938, 8, Jan.–Nov.; 1939, 9; 1940, 10, Jan.–Apr.

Law Library Journal [American Association of Law Libraries]
1954, 47 —

An Leabharlann: journal of the Library Association of Ireland
1953, 11 —

Lebende Sprachen: Zeitschrift für fremde Sprachen in Wissenschaft und Praxis
1956, 1, 2, 4–6; 1957, 2; 1958, 3, 1–3, 5, 6; 1959, 4; 1960, 5, 1–3, 6; 1961, 6–1963, 8; 1964, 9, 1, 3–6; 1965, 10 —

Liaison: the news-sheet of the Library Association
Jan 1957–June 1960. *From July* 1960, *inset in* **Library Association Record**

Librarian and Book World
1950, 39; 1951, 40; 1952, 41, 3, 4; 1953, 42, 4; 1954, 43; 1955, 44, 1–9; 1956, 45, 1–10; 1957, 46; 1958, 47, 1–11; 1959, 48, 1–10; 1960, 49, 1–11; 1961, 50, 1–10. *Ceased publication*

Library Association Record
3rd Series: 1931, 1–1933, 3; *4th Series*: 1934, 1–1946, 48; 1947, 49, 1–6, 8–12; 1948, 50 —

The Library Binder
1956, 4 —

Library Herald [Delhi Library Association]
1958–59, 1–1960–61, 3; 1962–63, 5, 2; 1963–64, 6 —

Library History (*formerly* **Library History Group Newsletter**)
1967, 1 —

Library History Group Newsletter
[1963] 1–1966, 7. *Continued as* **Library History**, q.v.

Library Journal [American Library Association]
1945, **70**, 1–6, 8, 10, 13–18, 20–22; 1946, **71**, 1–21; 1947, **72**; 1948, **73**, 1, 2 (pt. 1), 3–21, 22 (pt. 1); 1949, **74**, 1–6, 9–22; 1950, **75**, 1–14, 16–22; 1951, **76**–1954, **79**; 1955, **80**, 1–21; 1956, **81**, 1–22; 1957, **82**, 1–5, 7–11, 13–15, 17–22; 1958, **83**, 1–19, 22; 1959, **84**, 2–5, 7–14, 16, 19, 20, 22; 1960, **85**, 1–9, 11–13, 15, 17–22; 1961, **86**, 1–11, 13–20, 22; 1962, **87**, 2–7, 9–22; 1963, **88**, 1–19, 21; 1964, **89**, 1–13, 15–17, 19–22; 1965, **90**, 1–11, 13–21; 1966, **91**, 1–11, 13–22; 1967, **92** —

Library Literature [American Library Association]
1933 —

Library of Congress Information Bulletin
1947–49 (incomplete); 1950, **9**, 1–15, 17–52; 1951, **10**, 1–21, 23–43, 45–52; 1952, **11**; 1953, **12**, 1–8, 10–22, 24–52; 1954, **13**, 1–5, 7, 9–19, 21, 22, 24–28, 30–52; 1955, **14**, 1–14, 16–52; 1956, **15**, 1, 2, 4–28, 32–39; 1957, **16**, 1–38, 40–50, 52; 1958, **17**, 1–8, 10–14, 16–24, 26–35, 37–46, 48–52; 1959, **18**, 1–5, 7–21, 23–41, 43–50; 1960, **19**, 2–22, 24–40, 42–48, 50–52; 1961, **20**, 1–6, 8–15, 17–20, 23–29, 31–52; 1962, **21**, 1–18, 20–53; 1963, **22**; 1964, **23**, 1–18, 20–52; 1965, **24** —

Library of Congress PL-480 Newsletter
1963, 6 —

Library of Congress Quarterly Journal of Current Acquisitions
1943–44, **1**; 1944–45, **2**; 1945–46, **3**, 1, 3; 1947–48, **5**, 3, 4; 1948–49, **6**; 1949–50, **7**, 1–3; 1950–51, **8**; 1951–52, **9**; 1952–53, **10**, 2–4; 1953–54, **11**–1955–56, **13**; 1956–57, **14**, 2–4; 1958–59, **15**–1962–63, **20**. *Continued as* **Quarterly Journal of the Library of Congress**, q.v.

Library Periodicals Round Table Newsletter [American Library Association]
1954, **1**, 1–3; 1955, **2**; 1956 **3**; 1957, **4**, 1–3; 1958, **5**, 1–3; 1959, **6**, 1; 1960, **7**, 1, 2, 4; 1961, **8**, 2; 1962, **9**, 1. Index to Vols. 1–3

Library Quarterly [University of Chicago]
1942, **12**, 4; 1943, **13**; 1944, **14**, 4; 1945, **15**, 1; 1946, **16**–1951, **21**; 1952, **22**, 2–4; 1953, **23**–1964, **34**; 1965, **35**, 1, 2, 4; 1966, **36** —

Library Research in Progress [U.S. Department of Health, Education and Welfare]
1959–64, 1–14. *Ceased publication*

Library Resources and Technical Services (*incorporating* **Journal of Cataloguing and Classification** *and* **Serial Slants**)
1957, 1 —

Library Review [Glasgow]
1934, **29** —

Library Science Abstracts
1950, 1 —

Library Science with a Slant to Documentation
1964, 1 —

Library Technology Reports [American Library Association]
1965 —

Library Trends
1952–53, **1**; 1953–54, **2**, 1–3; 1954–55, **3**–1956–57, **5**; 1957–58, **6**, 1, 2, 4; 1958–59, **7**; 1959–60, **8**, 1–3; 1960–61, **9** —

Library World
1950, **52**, 595–600; 1950–52, **53**, 601–607, 609–620, 622–624; 1952, **54**, 625–627, 629, 630; 1954, **55**, 643–648; 1954–55, **56**–1961–62, **63**; 1962–63, **64**, 745, 747–750, 752–756; 1963–64, **65**; 1964–65, **66**, 770–780; 1965–66, **67** —

Libri: international library review and IFLA communications
1950–51, 1–1959–60, **9**; 1960–61, **10**, 1, 2, 4; 1961–62, **11** —

Literatur zum Bibliothekswesen [Berlin]
1966, 1, 1 —

The London Librarian
1956, **2**, 9; 1957, **3**, 8; 1958, **4**, 4 1959, **5**, 1; 1961, **7**, 1–4, 6, 9, 10; 1962, **8**, 1, 3, 5–10; 1963, new series, 1–14, 16–26, 28–33, 35 —

Machine Accounting and Data Processing
1958–59, 1, 1, 3. *Continued as* **Punched Card Data Processing**, q.v.

Management Today
1966 —

Manchester Review [Manchester Public Libraries Committee]
1946, **4**, autumn, winter; 1947, **4**, spring, autumn, winter; 1948, **5**, spring, autumn, winter; 1949–50, **5**, spring, autumn, winter, summer; 1953, **6**, spring, summer autumn, winter; 1954–55, **7**, spring, summer, autumn, winter; 1956, **7**, spring, autumn, winter; 1957, **8**, spring, autumn, winter; 1958–59, **8**, spring, summer, autumn, winter; 1960, **9**, spring, summer, winter; 1961, **9** —

Maritime Library Association Bulletin
1954, **18**, 3, 4; 1954–55, **19**–1957–58, **22**. *Continued as* **Atlantic Provinces Library Association Bulletin**, q.v.

Mason International (*continuation of* **Arclight Review**)
1963–64. *Ceased publication*

Mechanical Translation
1954, **1**; 1955, **2**; 1956, **3**, 1, 2; 1957, **4**–1961, **6**; 1962, **7**, 1

Medical Documentation [Medizinische Dokumentation] (*continuation of* **Dokumentation in Medizin und Biologie**)
1960, **4**, 1, 3, 4; 1961, **5**. *Continued as*

Methods of Information in Medicine, q.v.

Methods of Information in Medicine [Methodik der Information in der Medizin] (*formerly* **Medical Documentation**)
1962, 1, 2–4; 1963, 2; 1964, 3, 1, 3/4; 1965, 4, 1; 1966, 5 —

Metodika a Technika Informaci [Prague
1965 —

Micro Library [International Documentation Centre]
1958–59, 1, 1, 2/3, 6/7; 1959, 2, 1

Micro Photo Reader: national newsletter of microfilming for libraries
1964, 5, 2; 1965–66, 5, 1, 2, 4, 5; 1967, 7, 1 —

Microcard Bulletin [Microcard Editions Inc.]
1948–49, 1–4; 1950–56, 6–16; 1958–65, 18–30

Microcosm [University Microfilms Inc.]
1956, 2, 4; 1957, 3, 1, 2, 4; 1958, 4, 1–3; 1959, 5, 1, 2; 1960–61, 6; 1961–62, 7; 1962, 8, 1–3; 1964–65, 9; 1965–66, 10, 1, 3, 4; 1966, 11 —

Microdoc: journal of the Microfilm Association of Great Britain
1962, 1; 1963, 2; 1964, 3, 1–3; 1965, 4 —

Microfiche Foundation Newsletter
1963, 1–8, 10, 12; 1964 —

Microfilm Association of Great Britain Group A Newsletter
1966 —

Minerva: review of science learning and policy
1962–63, 1 —

Mitteilungen aus dem wissenschaftlichen Bibliothekswesen der Deutschen Demokratischen Republik
1964, 2, 7, 8, 10–12; 1965, 3, 8–12; 1966, 4, 1–5, 8–12; 1967, 5 —

Mitteilungen der Vereinigung Osterreichischer Bibliotekare
1965, 18, 1; 1966, 19; 1967, 20 —

Monotype News Letter
1556–59, 49–57; 1961–62, 61–65

Monotype Recorder
1536–37, 35, 4; 1937, 36, 1–3; 1938, 37, 3; 1939, 38, 1; 1956, 40, 3, 4; 1957, 41, 1–4. *Ceased publication*

Mousaion [University of South Africa]
1955, 1 —

Museum [UNESCO]
1958, 11, index; 1959, 12, 1, 3, 4, index; 1960, 13, 1–4; 1961, 14, 1–3, index; 1962, 15, 1, index; 1963, 16, 1–3; 1964, 17, 1–3

Museums Journal
1949–50, 49, 5–8; 1950–51, 50, 4–6, 8, 12; 1951–52, 51, 1, 3–10, 12; 1952–53, 52

Müszaki Könyvtárosok Tájékoztatója
1960, 7, 1–6; 1961, 8, 1–4, 6; 1962, 9, 1–6. *Continued as* **Tudományos es Müszaki Tájékoztatós,** q.v.

N.C.L. Occasional Newsletter [National Central Library]
1963, 2 —

N.R.C. Research News [National Research Council, Canada]
1950, 3, 3–5, 7–12; 1951, 4–1953, 6; 1954, 7, 1–5, 7–12; 1955, 8, 1–4, 6–9; 1956, 9, 1–6, 8–12; 1957, 10, 1–3, 5–12; 1958, 11, 1, 2; 1961, 14, 3, 4; 1962, 15, 3, 4; 1963, 16 —

Nachrichten/Nouvelles/Notizie [Vereinigung Schweiz. Bibliotekare *and* Schweiz. Vereinigung für Dokumentation]
1950, 26, 4; 1951, 27; 1952, 28, 1–3, 5, 6; 1953, 29–1956, 32; 1957, 33, 1–3, 5, 6; 1958, 34; 1959, 35, 1–4, 6; 1960, 36–1963, 39; 1964, 40, 1–4; 1965, 41 —

Nachrichten aus dem wissenschaftlichen Bibliothekswesen der Deutschen Demokratischen Republik
1960, 6, 11, 12; 1961, 7, 1, 2, 4–12; 1962, 8, 1–8, 10–12

Nachrichten für Dokumentation
1950, 1–1959, 10; 1960, 11, 2, 4; 1961, 12, 1, 2, 4; 1962, 13 —

Nachrichten für wissenschaftliche Bibliotheken [Verein Deutscher Bibliothekare]
1953, 6, 1–6, index

Nantis News Bulletin [Nottingham and Notts. Technical Information Service]
1963, 1, 2; 1966, 4 —

National Archives Staff Information Circulars [United States]
1946, 13; 1950, 15

National Archives Staff Information Papers [United States]
1950, 16; 1951, 19

National Diet Library Newsletter (Japan) (*Continuation of* **Indo-Pacific Exchange Newsletter**)
1963–66, 17–20, 22, 23

National Micronews: official journal of the National Microfilm Association
1961–62, 52–61; 1963–64, 62–73; 1965, 74, 75, 77–79; 1966, 80 —

Nature
Current year and indexes only

Nauchno-Technicheskaya Informatsiya [Moscow]
1963, 1, 2 —

Nederlandse Technisch-Wetenschappelijke Literatuur
1953, 1, 1–9; 1954, 2, 1–5, 7–11; 1955, 3, 1–5,7–12; 1956, 4–1958, 6

New Publications in the Unesco Library
1965 —

New Scientist
Current year only

New Zealand Libraries (*formerly* **New Zealand Library Association Bulletin**)
1937–38, **1**, 1–8, 10–12; 1938–39, **2**, 1, 2, 4–12; 1939–40, **3**, 1–3, 6, 12; 1941–42, **5**, 2, 6, 8; 1942–43, **6**, 7, 9, 12, 14, 16; 1944, **7**, 1–5; 1946, **9**, 5, 6; 1955, **18**–1961, **24**; 1962, **25**, 2–11; 1963, **26**; 1964, **27**, 1–9, 11; 1965, **28** —

New Zealand Library Association Bulletin
1937, **2**, 2, 4. *Continued as* **New Zealand Libraries**, q.v.

Newberry Library Bulletin [Chicago]
1960, **5**, 4–6; 1963, **6**, 2

News About Z39 [American Standards Association]
1965 —

News and Notes [Special Libraries Association]
1962, 1–3; 1963, 3, 4; 1964, 1, 2, 4; 1965, 1–3; 1966; 1967 —

Northern Aslib Bulletin
1956, **1**, 1; 1958, **3**, 1; 1959, **4**, 1, 2; 1960, **5**, 1; 1962, **7**, 3; 1963, **8**; 1964, **9**, 1, 3, 4; 1965, **10**, 1; 1966, **11**, 1, 3, 4; 1967, **12** —

Northern Ireland Libraries
1962, **3**, 4; 1963, **4** —

Note di Bibliografia e Documentazione
1955, **25**, 6–12; 1956, **26**, 1–3, 5–12; 1957, **27**

Nouvelles de la Documentation [Brussels]
1964, **1** —

O. & M. Bulletin [H.M. Treasury]
1950, **5**, 5; 1951, **6**, 2; 1952, **7**, 1, 2, 4–6; 1953, **8**–1959, **14**; 1960, **15**, 1–4, 6; 1961, **16** —

OMKDK Modszertani Kiadvanyok (*continuation of* **OMKDK Modszertani Kiadvanysorozata**) [Budapest]
1966 —

OMKDK Modszertani Kiadvanysorozata [Methodological Publications Series of the Hungarian Technical Library and Documentation Centre]
1961, 3–5; 1962, 1–3, 5; 1963, 1, 2; 1964, 1–5; 1965, 1–5. *Continued as* **OMKDK Modszertani Kiadvanyok**, q.v.

OSTI Newsletter [Department of Education and Science]
1966 —

Office Machine Guide
1963 —

Office Magazine
1954, 1–1964, **11**. *Continued as* **Office Methods and Machines**, q.v.

Office Management: journal of the Institute of Office Management
1952, **6**, 11, 12; 1953, **7**–1955, **9**; 1956, **10**, 1–3, 5–12; 1957, **11**–1959, **13**; 1960, **14**; 1–11; 1961, **15**; 1962, **16**; 1963, **17**, 1–7

Office Methods & Machines (*continuation of* **Office Magazine**)
1965, **12** —

Perpustakaan: official journal of the Library Association of Singapore and the Library Association of Malaysia
1966, **1** —

Poligrafiya [Moscow]
1966 —

Private Libraries Association Quarterly
1957–58, **1**, 1–5. *Continued as* **The Private Library**, q.v.

The Private Library (*continuation of* **Private Libraries Association Quarterly**)
1958–59, **2**, 3–6; 1960–61, **3**, 1–3, 5, 6; 1962, **4**; 1964, **5**, 3, 4; 1965, **6** —

Probleme Actuale in Munca de Documentare [Bucarest]
1965–1966. *Continued as* **Probleme de Documentare si Informare**, q.v.

Probleme de Documentare si Informare (*formerly* **Probleme Actuale in Munca de Documentare**)
1967, **1**, 2

Proceedings of the British Society for International Bibliography
1939–40, **1**, 1–4; 1940–41, **2**, 1–3, 5; 1941–42, **3**, 1, 2, 5; 1942–43, **4**, 1–4, 6; 1943–44, **5**, 1–6; 1944–45, **6**, 1–6; 1945–46, **7**, 1–5; 1946–47, **8**, 1–5; 1947–49, **9**, 1–6; indexes, 1–9. *Ceased publication*. (Society incorporated in Aslib in 1948.)

Program: news of computers in British University Libraries
1966, **1** —

Przeglad Biblioteczny [Warsaw]
1946, **14**, 1; 1947, **15**, 3, 4; 1948, **16**; 1950, **18**, 3, 4; 1951, **19**–1956, **24**

Publisher: the monthly journal of publishing management
1964, **1**, 1–7, 9, 11

Publisher: the quarterly journal of publishing management
1966, **26**

Punched Card Data Processing (*continuation of* **Machine Accounting and Data Processing**)
1959, **1**, 4–7. *Continued as* **Data Processing**, q.v.

Quarterly Bulletin of the International Association of Agricultural Librarians and Documentalists
1956, **1**, 1; 1957, **2**–1959, **4**; 1960, **5**, 1, 2; 1963, **8**, 4

Quarterly Bulletin of the South African Library
1952–53, **7** —

Quarterly Journal of the Library of Congress (*continuation of* **Library of Congress Quarterly Journal of Current Acquisitions**)
1964, **21** —

Recorded Sound (*formerly* **Bulletin of the British Institute of Recorded Sound**)
1961, 1 —

Referativnyi Zhurnal. Otdel'nyi Vypusk 59: Nauchnaya i Tekhnicheskaya Informatsiya [VINITI]
1963, 1, 1–3; 1965, 3, 4–6; 1966, 4 —

Reol: Nordisk Biblioteks Tidsskrift
1962, 1, 1–4; 1963, 2, 1–4; 1964, 3, 1, 2

Repro: quarterly journal of the Institute of Reprographic Technology
1963 —

Reproduction [Croydon]
1964, 1; 1965, 2; 1966, 3, 1–10, 12; 1967, 4 —

Reprographie: Zeitschrift für die gesamte Kopier- und Vervielfältigungstechnik
1961, 1; 1962, 2; 1963, 3, 1–5, 8, 9; 1964, 4 —

Research: a journal of science and its applications
1947, 1, 2; 1956, 9, 1–12; 1957, 10, 9; 1958, 11, 1–3, 5–7, 11, 12; 1962, 15, 2, 6

Research in Librarianship [Oldham, Lancs]
1965, 1 —

Reviews of Data on Research and Development
1956–64, 1, 2, 8–11, 13, 17, 19, 21–26, 28–36, 39–44. *Continued as* **Reviews of Data on Science Resources**, q.v.

Reviews of Data on Science Resources (*formerly* **Reviews of Data on Research and Development**)
1964, 1–5, 7 —

Revue de la Documentation (*continuation of* **F.I.D. Communicationes**)
1947, 14–1961, 28. *Continued as* **Revue Internationale de la Documentation**, q.v.

Revue Internationale de la Documentation (*continuation of* **Revue de la Documentation**)
1962, 29–1965, 32. *Ceased publication. See also* **F.I.D. Newsletter**

Revue Internationale du Droit d'Auteur
1954, 4 —

S.D.C. Magazine [System Development Corporation]
1963, 6, 6; 1964, 7, 11, 12; 1965, 8, 1–11; 1966, 9, 2–6, 9, 10; 1967, 10, 2 —

S.L.A. News: official news sheet of the Scottish Library Association
1960, 40; 1961, 47, 48, 50; 1962, 51

S.T.W.E. Review (*continuation of* **The Technical Writer**)
1958, 5, 1–4; 1959, 6, 1–3. *Continued as* **S.T.W.P. Review**, q.v.

S.T.W.P. Review: journal of the Society of Technical Writers and Publishers (*continuation of* **S.T.W.E. Review**)
1962, 9–1965, 12; 1966, 13, 1–3. *Continued as* **Technical Communications**, q.v.

Sci-Tech News
1956, 10, 1–3; 1957, 11, 1, 2; 1958, 12–1964, 18; 1965, 19, 2–4; 1966, 20 —

Science
Current year only

Science Citation Index
1961; 1964 —

Science Information News
1959–60, 1, 1–6. *Continued as* **Scientific Information Notes**, q.v.

Scientific American
1964, 210 —

Scientific Information Notes (*continuation of* **Science Information News**)
1960–61, 2; 1961–62, 3, 1, 3–6; 1962–63, 4 —

Scientific World
1957, 1, 1, 2; 1958, 2, 3, 4; 1959, 3, 5, 6, 8; 1960, 4, 1–4; 1961, 5, 1, 2

Serial Slants
1950–51, 1; 1951–52, 2; 1952, 3, 1, 2; 1953, 4–1956, 7. *Continued in* **Library Resources and Technical Services**, q.v.

Small Offset User
1957, 6, 63–1960, 9, 107; 1960, 10, 109–1964, 13, 155; 1964–65, 14, 158–165, 168; 1965, 15, 170 —

South African Libraries
1946–47, 14, 2–4; 1947–48, 15–1964–65, 32; 1966–67, 34, 2 —

Sovetskaya Bibliografia
1958, 49 —

Special Libraries
1910, 1 —

Special Libraries Association Bulletin
1960–61, 10, 2, 3; 1961, 11, 1, 2. *Continued as supplement to* **Special Libraries**, q.v.

Stet: the house magazine for house magazine editors
1957–58, 204–219

Studii si Cercetari [Bucarest]
1964, 6 —

Systems [New York]
1956, 20, 3–6; 1957, 21, 1–6; 1958, 22, 1–3, 5, 6; 1959, 23, 1–4; 1959, 24, 5, 6; 1960, 25, 1

Systems Management: recording, retrieval, reproduction of data and information (*continuation of* **Data Processing and Microfilming Systems**)
1961, 2, 1–4; 1962, 3, 1–6

T.A. Informations (*continuation of* **Traduction Automatique**)
1965 —

T.P.A. Journal (*Formerly* **T.P.A. Newsletter**)
1963–64, 1, 1–6; 1964–66, 2, 1–5, 7–12, 14. *Continued as* **Technical Publications Journal**, q.v.

T.P.A. Newsletter [Technical Publications Association]
July 1963. *Continued as* **T.P.A. Journal**, q.v

Technical Communications (*continuation of* **S.T.W.P. Review**)
1967, 14 —

Technical Education & Industrial Training
1959, 1–1963, 5; 1964, **6**, 1, 4–12; 1965, 7, 1–4, 6–12; 1966, **8** —

Technical Information [European Productivity Agency]
1954–55, 1, 1–5, 8, 9, 11, 16–18; 1956, **2**, 1–12, Suppls. *Continued as* **Technical Information Bulletin**, q.v.

Technical Information Bulletin (*continuation of* **Technical Information**)
1957, 3, 1–6

Technical Publications Journal (*continuation of* **T.P.A. Journal**)
1966–67, 3 —

Technical Translation Bulletin (*continuation of* **Engineering Translator's Bulletin**)
1961, 7 —

The Technical Writer (*continuation of* **S.T.W.E. Journal** *and* **Technical Writing Review**)
October 1957. *Continued as* **S.T.W.E. Review**, q.v.

Technical Writing Review [Society of Technical Writers]
1954, 1, 1; 1954–55, 2; 1956, 3; 1957, 4, 1, 2. *Continued in* **The Technical Writer**, q.v.

The Technologist
1964, 1 —

Tennessee Librarian: quarterly journal of the Tennessee Library Association
1958, 10, 2; 1959, 11, 2–4; 1960, **12**, 1–3; 1961, 13, 1, 3, 4

Tidskrift for Dokumentation [Stockholm]
1949, 5–1960, **16**; 1961, 17, 1, 3–6; 1962, 18, 1–3, 5; 1963, 19 —

Tijdschrift voor Efficientie en Documentatie [The Hague]
1948, 18; 1949, 19; 1950, 20, 1–11; 1951, 21–1957, 27; 1958, 28, 1–10, 12; 1959, 29 —

Times Literary Supplement
Current 3 months only

Toshokan-Kai [The Library World] [Kyoto]
1953, 5, 1–4; 1954, **6**, 1–6; 1955, 7, 1–6; 1956, 8, 1–4

Toshokan Zasshi [Library Journal] [Tokyo]
1962, **56**, 4–12; 1963, **57** —

Traduction Automatique: bulletin trimestrielle de l'Association pour l'Etude et le Développement de la Traduction Automatique et de la Linguistique Appliquée
1960–61, 1–1964, 5. *Continued as* **T.A. Informations**, q.v.

Translation Enquirer [Science Service, New York]
1962–63, series 4, 1–12; 1963, series 5, 1–4; 1964–65, series 6, 1–12; 1966, series 7 —

Translator's Forum [Aslib Textile Group]
1954, 1–3.

Tudományos és Muszaki Tájékoztatás (*continuation of* **Müszaki Könyvtárosok Tájékóztatója**) [Budapest]
1963, 10, 1–10; 1964, 11, 1–7, 9, 10; 1965, **12** —

Unesco Bulletin for Libraries
1947, 1, 2–9; 1948, **2** —

Unesco Chronicle
1955, 1, 1–6; 1956, **2**; 1957, 3, 1–7, 10–12; 1958, 4, 1–11; 1959, 5, 1–3, 6, 7, 11, 12; 1960, **6** —

Unesco Copyright Bulletin
1948, 1, 1, 2; 1949, **2** —

Unesco Information Bulletin on Reading Materials
1959, 1, 2–4, index; 1960, **2**, 2, 4; 1961, **3**, 1–4, index; 1962, **4**, 1, 2

Unesco Monthly Bulletin of the International Advisory Committee for Documentation and Terminology in Pure and Applied Science (*continuation of* **Unesco Monthly Circular on Documentation and Terminology in the Natural Sciences**)
1955. *Continued as* **Unesco Monthly Bulletin on Scientific Documentation and Terminology**, q.v.

Unesco Monthly Bulletin on Scientific Documentation and Terminology (*continuation of* **Unesco Monthly Bulletin** of the International Advisory Committee for Documentation and Terminology of Pure and Applied Science)
1956–60. *Continued in* **Bibliography, Documentation, Terminology**, q.v.

Unesco Monthly Circular for Members of Unesco Committees and Collaborating Bodies concerned with Documentation of the Natural Sciences
1952–53, 1–8, 10–18, cumulative index to 1–9. *Continued as* **Unesco Monthly Circular on Documentation and Terminology in the Natural Sciences**, q.v.

Unesco Monthly Circular on Documentation and Terminology in the Natural Sciences (*continuation of* **Unesco Monthly Circular** for Members of Committees and Collaborating Bodies concerned with the Documentation of the Natural Sciences)
1954. *Continued as* **Unesco Monthly Bulletin** of the International Advisory Committee for Documentation and Terminology in Pure and Applied Science, q.v.

University of Illinois Library School Occasional Papers
1949, 1 —

University of London School of Librarianship and Archives Occasional Publications
1954, 5 —

Vjesnik Bibliotekara Hrvatske [Zagreb]
1950, 1 —

Wilson Library Bulletin
1933, **7**, 10; 1933–34, 8–1939–40, **14**; 1940–41, **15**, 1, 2, 5, 7–10; 1941–42, **16**, 2–10; 1942–43, **17**; 1943–44, **18**; 1944–45, **19**, 1–6, 8–10; 1945–46, **20**, 1, 2, 4–6, 8–10; 1946–47, **21**–1950–51, **25**; 1951–52, **26**, 1–4, 6–10; 1952–53, **27**–1955–56, **30**; 1956–57, **31**, 1–5, 7–9; 1957–58, **32** —

Zeitschrift für Bibliothekswesen und Bibliographie [Frankfurt]
1954, 1 —

Zentralblatt für Bibliothekswesen [Leipzig]
1954, **68**; 1955, **69**; 1963, **77**, 3, 6–12; 1964, **78**, 1–9, 11, 12; 1965, **79**, 1–11; 1966, **80** —

ZIID-Zeitschrift (*continuation of* **Dokumentation**) [Berlin]
1965, **12** —

ASLIB CHEMICAL GROUP
1967 CONFERENCE

The Conference was held on Monday 15th to Wednesday 17th May at Attingham Park, near Shrewsbury, to consider what action information officers and librarians in the agricultural chemicals, pharmaceuticals and plastics industries might need to take to meet the increased demands placed on their services by the predicted expansion of these industries.

Several overseas delegates were among the seventy-four that attended. It was decided that the conference would consist mainly of discussion in working parties following a talk by an authoritative speaker from each of the three industries.

The conference was preceded by a visit to the Information Division of the Rubber and Plastics Research Association and in the evening of the first day was entertained by Sir George Trevelyan, Warden of Attingham Park.

Summaries of the papers, together with the conclusions of the working parties, are given below.

EXPANSION IN THE AGRICULTURAL CHEMICAL INDUSTRY

Though world agricultural production increased by 32 per cent during the decade 1955-65, the net increase in production per head of population was only about 7 per cent, because the world's population increased by 21 per cent during the same period. By the year 2000 the world's population will have doubled again. The provision of adequate food for the teeming millions is the most important task of agriculture and of the agricultural chemical industry which forms an essential part of it.

The agricultural chemical industry provides fertilizers, and chemicals which protect the crops from insect and fungal attack and competition from weeds, and subsequently the harvested crop in storage, improve animal health in livestock production and last, but not least, improve the health of mankind through the control of insect-borne diseases. It has been estimated, for instance, that but for pesticides the food losses throughout the world, due to pests and diseases, would be equal to 30 per cent of the amount now grown each year. Food losses have, however, by no means yet been eliminated. It is not surprising, therefore, that the agricultural chemical industry is rapidly expanding in response to the need for more food.

The principal products of the pesticide industry are insecticides (29 per cent), fungicides (24 per cent) and herbicides (24 per cent), but the projected situation in 1975 shows an increasing emphasis on herbicides, largely at the expense of insecticides. This arises from the expected increase in the cost of labour: weed control by manual hoeing will be increasingly replaced by chemical treatment.

Synthetic chemicals will continue to play the major part in pest control in the foreseeable future. Undoubtedly new chemicals will appear which will be free from some of the shortcomings of the present generation of products. Their effective life-span (short or long as the case may be) will be more readily matched to the purpose for which they will be used and their mammalian toxicity will be lower, relative to their insecticidal or herbicidal potency.

Biological control of pests is expected to play an increasingly important role in the future and much fascinating research is being done in this field. Sex attractants which can misdirect the insect to its detriment, chemical- or radiation-induced sterilization, interference in the

normal development of insects and plants, and the use of bacteria and viruses which kill insects are among the many topics under investigation at the present time.

V. W. DAVID
Woodstock Agricultural Research Centre, 'Shell' Research Ltd.

EXPANSION IN THE PHARMACEUTICALS INDUSTRY

Librarianship information is one of the key factors in successful innovation. If the information side does not run well, then the whole innovatory process will be less efficient.

It is the association of different pieces of information which have some connection, though not a logical one, which leads to the new idea. So when we talk about the part played by information and librarianship we must guard against the idea that we should provide the innovators with the relevant information only, because if we do, they will no longer have this magpie collection which is absolutely essential if they are to produce fertile new ideas.

Properly assembled and properly motivated teams are essential and the information side has some part to play in this, although it is a smaller function.

Britain, whilst needing people of the creativity of Leonardo da Vinci, must recognise that realistically, if we are going to get more creativity, we have got to come further back into the pool of more average creative people and this makes it even more important to create the right climate for them to operate in. We must first encourage and stimulate the man by exposing him to a varied array of information and experience and by 'popularizing' the advances in other branches of science so that a man of one discipline is able and willing to understand and appreciate new advances in other fields.

The key concept in innovation is the whole question of increasing the pace of innovation, but since the whole history of invention shows that nearly all inventive steps are of moderate originality, increased pace can only be achieved by shortening the gap between each step up. This is very much a function of the information side, because it is rarely possible for one man alone to make all the steps of invention in a particular field. To shorten the gap between one step and the next means concentration on the efficient communication of each step in such a way as to stimulate the largest number of other people—who must be stimulated if someone is to think of the next step. Here is a field where there is tremendous scope for improvement.

Patents are an essential preliminary to getting disclosure and far too little attention has been given to this side of patents.

Since it is one of the most rapidly advancing industries and has one of the greatest expenditures on research in relation to its total income, the pharmaceutical industry is one of those most concerned to assure that the information services work really well. Its problems are particularly large because of the wide range of disciplines that are involved and the pace of advance.

Does our industry or any other group allocate sufficient of its resources to the information function? Is there scope for improvement in the presentation of data and in the efficiency of its retrieval? Is enough being spent on research leading to more effective information services?

G. R. FRYERS
Bayer Products Ltd.

EXPANSION IN THE PLASTICS INDUSTRY

It was largely through World War II that the industrial credentials of plastics were established in the material catalogue of nations. Not unnaturally many years of user experience were required before products of stable quality were obtained and such were the difficulties encountered in the early post-war years that at times it appeared plastics would never rank as more than poor substitutes for the more traditional materials. At this point the inevitability of logical development came to their aid in the shape of what has been loosely described as the Second Industrial Revolution. After the war the whole world was poised for a forward surge as the work of rehabilitation began, and the developments which had resulted from intensive war-time research gave plastics their opportunity. But despite the largely favourable

climate of opinion the degree of success that they attained varied throughout the world and it was evident that problems of psychology were as significant as those of technology. In the end, time was the deciding factor in the sense that a new generation of people grew up without the built-in prejudices of their elders, people who were prepared to accept new materials on their merits and to apply them whenever and wherever cost and performance justified doing so.

During recent years the governing factor in the establishment of the plastics industries as big business throughout the world has been the dominance of oil as the basic raw material. The overall pattern is now fairly defined and on the materials production side there are now fewer but much larger commercial units with lines extending from the basic oil through to finished products. This pattern will continue with the introduction of progressively larger production units working on small profit margins. Though new polymers will emerge, it is unlikely that the present production trends will change, so that the dominance of the thermoplastics and in particular polyethylene, PVC and polystyrene will continue. Improvements are likely to be effected by the development of co-polymers or blends. On the fabrication and manipulation side the status is changing and, as in the case of metals, the time may not be too far distant when these vast industries will be regarded as quite separate from the plastics industry proper.

There is likely to be little change in the world ranking in plastics. The USA still has a long lead over Western Europe, Japan and the United Kingdom, although it is possible that her percentage of world plastics production will continue to fall steadily. The USSR is rapidly emerging as a contender with Britain for fourth place and this will become more serious as her demand for more thermoplastics increases following her greater production of consumer goods. World production of plastics is still small tonnage-wise by traditional standards, but it is confidently predicted that it will reach 10^9 tons by the end of the century.

V. E. YARSLEY
Yarsley Research Laboratories Ltd.

CONCLUSIONS

Agricultural Chemicals Working Party

The Agricultural Chemicals Working Party consisted of seventeen members, 70 per cent of whom appeared to be concerned with marketing/economic rather than scientific/technical information. Rather less than half were concerned with agricultural chemicals as a major interest; two of the members belonged to large research organizations specifically dealing with agricultural chemicals.

The reference sources on agricultural chemicals literature at present available (*Chemical Abstracts*, CAB abstracts journals, *Bibliography of Agriculture, Pesticides Documentation Bulletin*) are considered to be very good by comparison with other fields. There are, however, shortcomings which have given rise to the following comments and recommendations.

Group recommendations

1 Access to information on marketing and economic aspects (in particular statistical information) of the agricultural chemical industry is very difficult and this tends to lead to considerable duplication of effort and expenditure in tracing such information (e.g. information of the type published by the US Tariff Commission), which is often vital for the efficient planning of new manufacturing or marketing operations. It is suggested that e.g. ABMAC be asked to look into the possibility of establishing a suitable clearing house for the collection and dissemination of such information.

2 The confusing terminology used in connection with agricultural chemical

compounds (multiple trade names, code numbers, common names, systematic names), and the fact that properties and applicational data are often reported at conferences, make it difficult to trace all published information on specific compounds.

It is recommended that an organisation such as ABMAC be asked to look into the possibility of establishing a compound registry, preferably one which would be compatible with the *Chemical Abstracts* compound registry.

3 It is recommended that, if possible, more effort should be devoted, e.g. by the CAB, to compiling current published information relating to specific pests and diseases of economic importance (perhpas in KWIC index form). CAB should also consider the provision of more current awareness services.

4 It is noted with approval that Chemical Abstracts Service is considering publishing a digest similar to CBAC, but related specifically to agricultural chemicals.

5 In view of the rapidly increasing importance of computer operated current awareness services, the Working Party stresses the need for more editorial emphasis on giving really informative titles to papers.

Pharmaceuticals Working Party

Group activity

Membership. It is regretted that only a small proportion of members of the Chemical Group with a pharmaecutical interest attended and it was hoped that the Committee would look into the question of increasing the membership of the Group.

Group recommendations

Patents. The need was felt for a clarification of the interpretation of Patent Law, since in practice its interpretation by the average information officer differed from that of the Courts. A symposium at a high level should be organized at which information officers, the patent agents and the lawyers could voice their opinions.

Computer services—Medlars. Although individual users' comments as to the improvement of the service might be passed back to Boston Spa, it was considered that a collective suggestion representing members of pharmaceutical concerns would carry more weight. It was felt that more detail would be welcomed, particularly in the computer print-outs.

Computer services—General. The setting up of the Chemical Society Research Unit at Nottingham and the training facilities provided by the NLL at Boston Spa could well be usefully extended to other large information stores as they become available.

Facilities at a National Level covering all aspects (e.g. *Chemical Abstracts,* Medlars, *Ringdoc*) and all other specialist groups should be provided. The establishment of regional contact points would appear to be desirable.

Co-operation. It is hoped that a means can be found to make *Science Citation Index* more easily available, especially in national libraries.

Abstracts. The standard of abstracts usually provided by the author was

deplored. While it was accepted that the author was not the best person to abstract his own work, it was suggested as a start that the learned societies in the UK be asked to co-operate by impressing upon referees the necessity of the author providing an adequate abstract.

Adequate titling and sub-titling of papers, bearing in mind the use of KWIC index could be carried out in the same manner.

Plastics Working Party

Abstracting services

1 It was noticeable that within the working party there was a certain lack of knowledge of commercial abstracting services. While this was rectified to some extent in discussion, it possibly indicates a need for a published survey of existing services.

2 Most information units require to hold or have access to *Chemical Abstracts* for retrospective searches, but it was suggested that the considerable additional expense of Post would be justified only if publication is speeded up sufficiently for it to be more attractive as a current awareness tool.

3 It was recommended that abstracting and other services should be urged to produce their material in more finely divided categories, to be made available separately. This would enable small firms with specialized fields of interest and large firms with marginal interests to subscribe to relevant categories at economic rates.

Materials data

1 It was recommended that RAPRA should be asked to survey sources of materials data, bearing in mind possible collaboration between RAPRA and commercial and other organisations.

Commercial information

1 The service provided by Search was recommended, but the insufficient release of company information was deplored.

2 It was recommended that a survey be made to identify areas not adequately covered at present and that an annotated list of sources of commercial (i.e. product and company) information be compiled. It was suggested that this might be undertaken by a sub-group of the Aslib Chemical Group.

3 It was recommended that the British Plastics Federation be asked to investigate plastics trade directories with a view to recommending the amplification of the entries.

4 It was recommended that periodicals such as *British Plastics* should be asked to consider indexing the commercial information that they publish.

Training

The provision of a short chemistry course with a bias towards polymer chemistry was discussed. Approximately one quarter of the working party expressed a desire for such a course, but considered it should be aimed at people with a background knowledge of chemistry.

Translation

1 It was recommended that a suitable body should review at regular intervals the East European, Far Eastern and other foreign language periodicals, particularly in the area of technology, with a view to suggesting additional titles requiring cover-to-cover translation.

2 It was recommended that Aslib should remind its members to advise them of new translations, including unpublished translations such as extracts, summaries, or rough drafts.

Computers

It was recommended that the Aslib Chemical Group Committee should investigate the possibility of arranging a meeting at which actual case studies of the use of computers for information retrieval as opposed to 'house-keeping' jobs could be presented.

Letter to the Editor

SCIENCE INFORMATION EDUCATION IN THE UK

Dear Sir,

The Postgraduate School of Librarianship, University of Sheffield, is currently engaged in a study of national education and training requirements for scientific and technological information and library work at all levels. The inquiry is supported by the Office for Scientific and Technical Information (Department of Education and Science), to which a report will be made when the investigation is complete.

Views have already been invited and obtained from a number of academic and professional bodies on the content, standard and organization of education and training at all levels. We feel it is essential, in addition, to be aware of the views of the widest possible range of individuals with an interest in this field, particularly management, librarians and information workers, scientists, technologists and engineers. Communications on this subject are invited by the undersigned and should be sent to the Postgraduate School of Librarianship, the University of Sheffield, Western Bank, Sheffield 10.

Yours faithfully,

W. L. SAUNDERS, *Director*
H. SCHUR, *Lecturer*

Postgraduate School of Librarianship,
University of Sheffield,
Sheffield 10.
6th July 1967.

SELECTIONS FROM THE RECENT LITERATURE

ALL ITEMS listed may be borrowed from the Aslib Library, except those marked *, which may be consulted in the Library.

Books and Pamphlets

AMERICAN LIBRARY ASSOCIATION
Continuing education for librarianship—conference, workshops and short courses, 1967–68. Chicago, the Association, 1967. ii, 22 p.

BLUNT, C. R.
A general model for simulating information storage and retrieval. State College, Pa., HRB-Singer Inc., 1966. [178] p. tables, diagrs. (AD 636 435).

BORKO, HAL, *and* BURNAUGH, HOWARD P.
Interactive displays for document retrieval. [BOLD]. Santa Monica, Calif., System Development Corporation, 1966. 25 p. illus. (SP-2557).

BUTLER, ROBERT W., *and* SCHOFIELD, PAULA Z.
Simultaneous production of catalog cards and computer input. Fort Detrick, Md., Aerobiology and Evaluation Laboratory, 1967. 43 p. tables. (AD 647 232).

CARTER, L. F., *and others*
National document handling systems. New York, Wiley, 1967. ix, 344 p. tables, diagrs. (Wiley Information Science Series.)

COLUMBIA UNIVERSITY. Bureau of Applied Social Research
Formal and informal satisfaction of the information requirements of chemists. New York, the University, 1966. [42] p. tables. (PB 173 261).

*DMITRIEFF, A.
Russian-English glossary of library terms. New York, Telberg Book Corporation, 1966. iii, 158 p. $9.80.

DRURY, A. T.
User survey of navy technical reports. East Coast Navy Interlaboratory Committee on Editing and Publishing, 1966. 9 [3] p.

DYKE, F. H., *and* DOUDNIKOFF, BASIL
Reference manual on a practical approach to information and data retrieval. London, Industrial Education International Ltd. [1967] 102, 32 [6] p. tables, diagrs.

FARRADANE, J., *and others*
Report on research on information retrieval by relational indexing. Part 1: methodology. London, City University, 1966. 60 p. tables, diagrs.

FILMSETTING a . . . supplement from *Printing Trades Journal*, 1967. London, Benn Bros., 1967. 31 p. illus., table.

GALLIZIA, ANGELO, *and others*
Towards the automatic analysis of natural language texts. Paris, N.A.T.O., AGARD, 1966. 17 p.

GRAY, JOHN, C. E., *comp.*
A list of subject headings pertaining to library science. Vancouver, British Columbia, University, School of Librarianship, 1966. 32 p. (Western Canadian Contributions to Librarianship, no. 3, November 1966).

GREAT BRITAIN. UNIVERSITY GRANTS COMMITTEE
Report of the Committee on libraries: [Chairman, Dr Thomas Parry]. London, H.M.S.O., 1967. x, 281 p. tables. 21*s*.

HEINTZE, INGEBORG
Shelving for periodicals. Lund, Sweden, Bibliotekstjanst, for IFLA, 1966. 71 p. illus., diagrs.

*HIGSON, C. W. J., *ed.*
Sources for the history of education: a list of material (including school books) contained in the libraries of the Institutes and Schools of Education together with works from the libraries of the University of Nottingham and of Reading. London, Library Association, 1967. 206 p. 96*s*. 72*s*. mem.

I.B.M. DATA PROCESSING DIVISION
Introduction to IBM system/360 direct access storage devices and organization methods. New York, IBM, 1966. 70 p. tables, diagrs. (Student text).

INTERNATIONAL COMPUTER TYPESETTING CONFERENCE, 1966
Advances in computer typesetting: proceedings of 1966 . . . conference. London, Institute of Printing, 1967. xiii, 306 p. tables, diagrs. £5.

INTERNATIONAL OCCUPATIONAL SAFETY AND HEALTH INFORMATION CENTRE
CIS classification: guide to the card service. 3rd ed. Geneva, the Centre, 1966. 57 p.

KESSLER, M. M.
TIP user's manual: a guide for on-line search and retrieval of the current literature in physics. Cambridge, Mass., Massachussetts Institute of Technology, 1965. [26] p.

KURTH, WILLIAM H., *and* GRIM, RAY W.
Moving a library. New York, Scarecrow Press, 1966. 220 p. tables.

MIKHAILOV, A. I., *and others*
Organization of scientific and technical information in the Communist world. Washington, D.C., Library of Congress, Aerospace Technical Division, 1966. vii, 87 p. diagrs. (ATD Rep. 66-11). Translation from Mikhailov et al. 'Osnovy nauchnoii informatsii' [Fundamentals of information science]. Ch. 7, sections 1-2. p. 494-544.

MORSE, GRANT W.
The concise guide to library research. New York, Washington Square Press, 1966. x, 214 p. $5.95.

NORTH AMERICAN AVIATION, INC. Autonetics Division
DOD user needs study, Phase II. Flow of scientific and technical information within the defense industry. Anaheim, Calif., N.A.A., 1966. 2 vols. tables, diagrs. Vol. 1: overview. Vol. 2: A. Technical description, B. Technical appendices.

PEETERS-HOUTERMAN, H. F.
Bibliography on microfiche, supplement no. 1. Delft, Microfiche Foundation, 1967. 11 p. (Publications on the microfiche no. 6).

PINGS, VERN N.
A plan for indexing the periodical literature of nursing: report of a study of the need for bibliographical control of the scholarly record of nursing. New York, American Nurses Foundation, 1966. xiii, 202 p. tables.

ROBERTSON, W. S. *and* SIDDLE, W. D.
Technical writing and presentation. Oxford, Pergamon, 1966. 118 p. diagrs. 21*s*.

ROBINSON, JOHN A.
Scanning and clustering: an exploratory investigation of retrieval strategies in free recall. Louisville, Kentucky, Louisville, University, College of Arts and Science, 1966. 11 p.

SYSTEM DEVELOPMENT CORPORATION
SDC digest: ORBIT—on-line retrieval of bibliographical text. Santa Monica, Calif., the Corporation [1967?]. [3] p.

URBACH, P. F.
A patent copy document system for the storage, retrieval, duplication and display of US patents. Washington, D.C., U.S. Patent Office, 1965. [127, 36] p. tables, diagrs.

WAY, DEREK J.
The student's guide to law libraries. London, Oyez Publications, 1967. 58 p. diagrs. 7*s*. 6*d*.

Articles and Papers

AMERICAN DOCUMENTATION INSTITUTE. Special Interest Group: Behavioral and Social Sciences
Information handling in the behavioral sciences. Reprinted from *American Behavioral Scientist*. vol.10, no.7, February 1967, p.8-12.

AVRAM, HENRIETTE D., *et al*
Fields of information on Library of Congress catalog cards: analysis of a random sample, 1950-1964. *Library Quarterly*, vol.37, no.2, April 1967, p.180-192.

BAPTIE, ALEX L.
The future of microfiche: its contribution is information availability. *Microfiche Foundation Newsletter*, no.14, May 1967 p.3-6.

BESWICK, NORMAN W.
The 'Library College'—the 'true university'? *Library Association Record*, vol.69, no.6, June 1967, p.198-202.

BOSE, H., *and* RAJAGOPALAN, T. S.
A new method of cyclic indexing. *Annals of Library Science and Documentation*, vol.13, no.3, September 1966, p.151-6.

BROOKES, B. C.
Scientific information and the computer. *Library Association Record*, vol.69, no.6, June 1967, p.191-7, 202.

BROWN, NORMAN A., *and* STRAIN, PAULA M.
Use of a shelflist. *Sci-Tech News*, vol.21, no.2, Summer, 1967, p.36-7.

CARLSON, WALTER M.
A management information system designed by managers. *Datamation*, vol.13, no.5, May 1967, p.37-9, 41, 43.
A technical management information system, installed at U.S. Department of Defence, in coordination with NASA—provides current data on research programme expenditures.

CHAPLIN, A. H.
Cataloguing principles: five years after the Paris conference. *Unesco Bulletin for Libraries*, vol.21, no.3, May-June 1967, p.140-5, 149.

A COMPARISON of justifying and non-justifying tape perforators. *CIS Newsletter*, April 1st, 1967. var. pag.

CONNORS, WILLIAM E.
Reclassification at the University of Maryland. *Library Resources and Technical Services*, vol.11, no.2, Spring 1967, p.233-42.

CONRAD, CARLETON C.
Co-ordination and integration of technical information services. *Journal of Chemical Documentation*, vol.7, no.2, May 1967, p.111-5. Paper presented before the Division of Chemical Literature, Symposium on Administration of Technical Information Groups, 152nd National Meeting of the American Chemical Society, New York, N.Y., Sept. 13th, 1966.

COPE, R. L.
Bibliography: a major pre-occupation of Soviet librarianship. *Australian Library Journal*, vol.16, no.2, April 1967, p.62-70.

COPIER on salvage work. *Office Equipment News,* 1st July 1967. p.19. Flood-damaged catalogue cards at the National Central Library, Florence, are being recopied by Rank Xerox.

DAY, MELVIN S.
Factors in building an operational information program. *Journal of Chemical Documentation,* vol.7, no.2, May 1967, p.107–9. Paper presented before the Division of Chemical Literature, Symposium on Resources for Information Systems, 151st National Meeting of the American Chemical Society, Pittsburgh, Pa., March 23rd, 1966.

DELAVENAY, E.
The Unesco Department of Documentation, Libraries and Archives: aims and prospects. *Unesco Bulletin for Libraries,* vol.21, no.3, May–June 1967, p.136–139.

DUNLAP, CONNIE
Automated acquisitions procedures at the University of Michigan library. *Library Resources and Technical Services,* vol.11, no.2, Spring 1967, p.192–202.

DUTTA, S., *et al*
Indian Science Abstracts: work-flow. *Annals of Library Science and Documentation.* vol.13, no.3, September 1966, p.133–41. Paper contributed to the Work-flow Seminar in Libraries, New Delhi, 21-24 November 1966.

EVANS, B. AGARD, *and* ROGERS, C. E.
The library network of the Ministry of Public Building and Works. Reprinted from *Progress in Library Science,* 1966: ed. Robert L. Collison, p.179–89.

FASANA, PAUL J.
Determining the cost of library automation. *ALA Bulletin,* vol.61, no.6, June 1967, p.656–61.

FIELD, F. BERNICE
The Union List of Serials: third edition. *Library Resources and Technical Services,* vol.11, no.2, Spring 1967, p.133–137.

FOSKETT, D. J.
Patterns in information dissemination and retrieval. Extracted from *Proceedings of the Royal Society of Medicine,* vol.60, May 1967, p.455–62. Paper presented to R.S.M. Library (Scientific Research) Section, 31st October 1966.

FREEMAN, MONROE E.
Determining costs of information systems. *Journal of Chemical Documentation,* vol.7, no.2, May 1967, p.101–6. Paper presented before the Division of Chemical Literature, Symposium on Resources for Information Systems, 151st National Meeting of the American Chemical Society, Pittsburgh, Pa., March 23rd, 1966.

GARVIN, PAUL I.
Problems of processing information in the behavioral sciences. 4p. Paper presented at Meeting on Information Handling in the Behavioral Sciences, Washington, October 3, 1966.

GEDDES, ANDREW
Library automation: an essential of service. *ALA Bulletin,* vol.61, no.6, June 1967, p.642–6.

GILLIS, C. N.
Biomedical information retrieval: a computer-based system for individual use. *Journal of Chemical Documentation,* vol.7, no.2, May 1967, p.98–100.

HANSON, C. W.
The pattern of demand on technical information/library services and its significance for librarians and information officers. *Nantis News Bulletin,* vol.4, no.4, January 1967, p.3–5.

HAYES, ROBERT M.
Data processing in the library school curriculum. *ALA Bulletin,* vol.61, no.6, June 1967, p.662–669.

HEINRITZ, FRED
Predicting the need for catalog expansion. *Library Resources and Technical Services,* vol.11, no.2, Spring 1967, p.247–8.

HICKEY, DORALYN J.
Bridging the gap between cataloguing and information retrieval. *Library Resources and Technical Services,* vol.11, no.2, Spring 1967, p.173–83.

HINES, THEODORE C.
Salaries and academic training programs for information scientists. *Journal of Chemical Documentation,* vol.7, no.2, May 1967, p.118–20. Paper presented before the Division of Chemical Literature, Symposium on Administration of Technical Information Groups, 152nd National Meeting of the American Chemical Society, New York, N.Y., September 13th, 1966.

HORNER, J. K.
Low-cost storage and retrieval of organic structures by permuted line notations: small collections. *Journal of Chemical Documentation,* vol.7, no.2, May 1967, p.85–8. Presented at the Wiswesser Line Notational Meeting of the Army Chemical Information and Data Systems (CIDS) Program at US Army Edgewood Arsenal, Edgewood Arsenal, Md., Oct. 6–7, 1966.

HUNTER, G. T.
Generalized information system: a program for file organisation and information retrieval in a university/college information system. Copied from *Journal of Educational Data Processing,* vol.3, no.4, Fall 1966, p.164–70.

JACKSON, EUGENE B.
The use of data processing equipment by libraries and information centers—the significant results of the SLA-LTP survey. *Special Libraries,* vol.58, no.5, May-June 1967, p.317–27.

KHRIPUNOV, I. A., *and others*
Automatic processing of information. Washington, Joint Publications Research Service, 1965. 10p. (JPRS 30, 494 TT: 65–31205.) Translated from *Avtomatika, Telemekhanika i Svyaz* (USSR) vol.8, no.9, 1964, p.9–12.

KIERSKY, LORETTA J.
Bibliography on reproduction of documentary information, 1966. *Special Libraries,* vol.58, no.5, May-June 1967, p.335–47. Bibliography of 291 items including annotations where necessary. Arranged under broad subject headings—equipment, applications, etc.

KUHLMAN, A. F.
The consumer survey of New Serial Titles. *Library Resources and Technical Services,* vol.11, no.2, Spring 1967, p.138–44.

MCCUNE, LOIS, *and* SALMON, STEPHEN R.
Bibliography of library automation. *ALA Bulletin,* vol.61, no.6, June 1967, p.674–5, 678–94.

MADDOX, JOHN
Is the literature dead or alive? *Nature,* vol.214, no.5093, June 10th 1967, p.1077–9.

MAIZELL, R. E.
Continuing education in technical information services. *Journal of Chemical Documentation.* vol.7, no.2, May 1967, p.115–17. Paper presented before the Division of Chemical Literature, Symposium on Administration of Technical Information Groups, 152nd National Meeting of the American Chemical Society, New York, N.Y., September 13th, 1966.

MARKEL, J. LOUISE
Training the new employee. *Sci-Tech News,* vol.21, no.2, Summer 1967, p.34–5, 50.

MARKUSON, BARBARA EVANS
The Library of Congress automation program: a progress report to the stockholders. *ALA Bulletin,* vol.61, no.6, June 1967, p.647–55.

MAY, KENNETH O., *and* JANKE, N. C.
Abuses of citation indexing. *Science,* vol.156, no.3777, 19th May 1967, p.890–1. Two replies to letter by J. Margolis, 10th March 1967, p.1213.

MIKHAILOV, A. I., *and others*
Informatika—novoe nazvanie teorii nauchnoi informatsii. [Informatics—new name for the theory of scientific information.] Translated from *Nauchno-Tekhnicheskaya Informatsiya,* no.12, 1966, p.35–9.

MULLEN, J. M.
Atom-by-atom typewriter input for computerized storage and retrieval of chemical structures. *Journal of Chemical Documentation,* vol.7, no.2, May 1967, p.88–93. Based on a paper presented before the Division of Chemical Literature, 150th National Meeting of the American Chemical Society, Atlantic City, N.J., Sept. 13, 1965.

NORMALISATION INTERNATIONALE des statistiques relatives aux bibliothèques. [International standardisation of library statistics.] *Bulletin des Bibliothèques de France.* vol.12, no.4, April 1967, p.125–44. Report of a conference organised by International Standards Office and IFLA at The Hague, 2–7 May 1966.

NUGENT, WILLIAM R.
The mechanization of the filing rules for the dictionary catalogs of the Library of Congress. *Library Resources and Technical Services,* vol.11, no.2, Spring 1967, p.145–66.

PETER, K. M., *and* RAJAGOPALAN, T. S.
A study on the scatter of contributions of Indian scientists in Indian and foreign periodicals: 1. Mathematics. *Annals of Library Science and Documentation* vol.13, no.3, September 1966, p.142–50.

PFLUG, GÜNTHER, *ed.*
Mechanisierung und Automatisierung in Amerikanischen Bibliotheken: Eindrücke einer Studienreise deutscher Bibliothekare in Frühjahr 1965. [special issue]. *Zeitschrift fur Bibliothekswesen und Bibliographie.* Sonderheft 6 [1967]. 323p. Details of all libraries visited, followed by discussion on different procedures, etc.

PRICE, DENNIS G.
Whither keypunch. *Datamation,* vol.13, no.6, June 1967, p.32, 34. Discussion of alternative equipment to keypunches, which had begun to cause a bottleneck in processing. Describes installation of data readers in New York State.

RADFORD, NEIL A.
Borrowing for research from a university library. *Australian Library Journal,* vol.16, no.2, April 1967, p.77–81.

RAGHAVENDRA, M. K., *and* KAMATH, V. A.
Dissemination of current scientific and technical information in the AEET. *Annals of Library Science and Documentation,* vol.13, no.3, September 1966, p.119–24. Paper contributed to the Work-flow Seminar in Libraries, New Delhi, 21–24 November 1966.

READY, WILLIAM E.
Punched card and/or computer control of a map collection. *Special Libraries,* vol.58, no.5, May-June 1967, p.365.

SCHIRMER, ROBERT F.
Thesaurus analysis for updating. *Journal of Chemical Documentation,* vol.7, no.2, May 1967, p.94–8. Presented before the Division of Chemical Literature, 151st National Meeting of the American Chemical Society, Pittsburgh, Pa., March 1966.

TELL, BJÖRN
Informationsunderlagets betydelse för indexeringen. [Document representation and indexer consistency.] *Tidskrift för Dokumentation,* vol.23, no.1, 1967, p.8–13.

THOMPSON, EVELYN, *and* FORRESTER, GEORGE
The automatic ordering of replacement titles for libraries in metropolitan Toronto. *Library Resources and Technical Services,* vol.11, no.2, Spring 1967, p.215–20.

THOMPSON, HAROLD B.
Limits of document retrieval techniques. Copied from *SAMPE Journal,* vol.3, no.2, February-March 1967, p.44–5.

[UNESCO]
Unesco library activities, 1965–66. *Unesco Bulletin for Libraries,* vol.21, no.3, May-June 1967, p.129–135, 139.

[UNESCO]
Unesco's programme for documentation, libraries and archives, 1967–68. *Unesco Bulletin for Libraries,* vol.21, no.3, May-June 1967, p.119–28.

VOOS, HENRY
Revision of the current Library of Congress catalog card format. *Library Resources and Technical Services,* vol.11, no.2, Spring 1967, p.167–72.

WEINSTEIN, EDWARD A., *and* GEORGE, VIRGINIA
Computer-produced book catalogs: entry form and content. *Library Resources and Technical Services,* vol.11, no.2, Spring 1967, p.185–91.

WEINSTOCK, MELVIN
Network concepts in scientific and technical libraries. *Special Libraries,* vol.58, no.5, May-June 1967, p.328–34.

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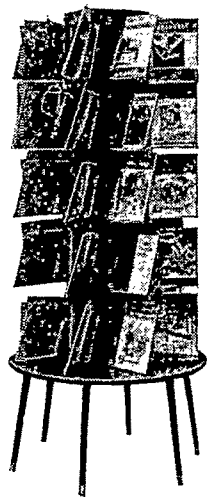

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Aslib Proc. vol.19 no.9 pp. 287-325 London, September 1967

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ASLIB PROCEEDINGS

incorporating Aslib Information

Volume 19 September 1967 Number 9

ASLIB CALENDAR 1967

September

TUE.26 – FRI.29.	Junior Introductory Course to Special Library and Information Work, Glasgow.

October

WED.4.	Technical Translation Group, 4 p.m. 'Teaching technical translation.'
MON.9. – THU.12.	41st Annual Conference at Harrogate.
TUES.17 – FRI.20	Junior Introductory Course to Special Library and Information Work, London.
TUE.17.	Course on handling Soviet and East European materials begins
WED.25.	Scottish Branch meeting. University of Strathclyde, Glasgow, 7 p.m. 'The provision of a library/information service for/by newspapers,' by Miss A. S. Brown. See paragraph below.
THU.26.	Evening meeting. 5 for 5.30 p.m. Royal Aeronautical Society. 'The role of information service in industrial disputes,' by Victor Feather, Assistant Secretary, TUC. See paragraph below.

November

THU.2.	Transport Group one-day conference on transport statistics at the Society of Motor Manufacturers and Traders Ltd.
WED.8.	Joint evening meeting with BSI Standards Associates' Section. 'Standards information—what you need and where to get it,' by R. L. Collison.
TUE.21 – FRI.24.	Course on business archives. See paragraph below.
WED.22.	Evening meeting. 'Experience in providing decentralized input to an international abstracts journal,' by J. E. Terry, AERE. See paragraph below.
THU.23.	Technical Translation Group, 5 p.m. 'Technical interpreting as an interesting sideline.'

December

WED.6.	Evening meeting. The 'Guinness book of records'.
WED.13.	Scottish Branch meeting at Royal Society of Edinburgh, 6.15 p.m. See paragraph below.
WED.20.	Aslib Christmas Party.

Staff Reorganization at Aslib

Mr L. J. Anthony, FLA, has been appointed to a new post of Assistant Director (Services) on the staff of Aslib and takes up his appointment at the beginning of October. Mrs Sauvee has kindly agreed to remain at work until he takes over. Mr Anthony is well known to the membership as the Librarian and Head of Documentation Services of the Culham Laboratory of the UK Atomic Energy Authority and as the former Deputy Librarian at Harwell; members of longer standing will remember him as Assistant Director at Aslib in 1954–55, when the consultancy service and first research activities were being established, and previously as Information Officer at British Telecommunications Research Ltd.

From the beginning of October the staff will be reorganized into three major departments:

Research Department under an Assistant Director (Research), Mr B. C Vickery. It will be concerned with research and consultancy.

Services Department under an Assistant Director (Services), Mr L. J. Anthony. It will be responsible for membership services, including conferences, courses, publications and library and information services, as well as with the provision of new services to meet members' needs.

Secretarial Department under a Secretary, still to be appointed. It will be responsible for internal administration and the duties normally associated with a Company Secretary's office.

With the implementation of plans for a major development in Aslib's research and consultancy work, involving a new department of ultimately some twenty-five persons, it is hoped that the reorganization will enable Aslib to embark with confidence on this further vital stage in its growth.

Business Records: Junior Introductory Course

Under the joint auspices of Aslib and The Business Archives Council, a Junior Introductory Course will be held from 21st to 24th November 1967 inclusive at Aslib Headquarters, 3 Belgrave Square, London SW1. This, the first of its kind, is intended to provide an introduction for those taking up junior posts in departments dealing with business records. It is designed to increase their efficiency by giving them a better understanding of the reasons for various routines and techniques they meet with in their work, and the function they fulfil in the framework of the whole organization. The fee for the course is eight guineas. A number of visits to important collections of modern business records will be included. Early application (to the Education Officer, Aslib) is essential, as the total number of places on the course is restricted to thirty.

Evening Meeting: *Nuclear Science Abstracts*

At the evening meeting on Wednesday 22nd November, Mr J. E Terry, of the Atomic Energy Research Establishment, Harwell, will speak on 'Experience in providing decentralized input to an international abstracts journal'—the UK contribution to *Nuclear Science Abstracts.*

Nuclear Science Abstracts has been published by the United States Atomic Energy Commission since 1947 as a comprehensive abstracting and indexing service for the international literature in nuclear science and technology. Recently several countries have entered into collaboration agreements with the USAEC and since January of this year the United Kingdom has been selecting from the British literature for *NSA* and providing descriptive cataloguing and abstracts.

The arrangements made in the UK avoid duplication of effort in scanning by taking full advantage of work that is already done in various libraries of the Atomic Energy Authority and (through a special contract) by the Institution of Electrical Engineers in producing *Physics Abstracts* and *Electrical Engineering Abstracts*.

Mr Terry will describe the setting up of this collaboration and give a progress report on how it has worked in practice. He will also take a look forward to the proposals for a computerized International Nuclear Information System (INIS) to be developed under the aegis of the International Atomic Energy Agency.

Standing Committees 1967–68

The following standing committees were appointed by Aslib Council at its meeting on 28th June 1967:

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An A.B.L.S. Observer

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Scottish Branch Programme for 1967-68

The coming session's programme will follow the lines introduced experimentally last year. Details will be circulated to the Branch Membership late in September or early in October. The following advance details are intended to enable members to reserve the dates indicated:

Wednesday 25th October 1967. 7 p.m. In the University of Strathclyde, Glasgow. Miss A. S. Brown, ALA, Library, Central Library, Paisley, will speak on 'The provision of a library/information service for/by newspapers'.

Wednesday 13th December 1967. Scottish Branch Christmas Party in the Reception Room of the Royal Society of Edinburgh, 24 George Street, Edinburgh 2, at 6.15 p.m. followed at 7.45 p.m. approximately by an address by Dr W. E. Batten, Head, Central Technical Information Unit, Imperial Chemical Industries Ltd, London.

Friday 29th March 1968. Annual General Meeting and One-day Branch Conference.

There will be a further evening meeting, probably in Glasgow in February, and further details will be given as soon as detailed arrangements have been concluded.

Tickets for the Christmas party (price 5*s*) and further details of meetings may be obtained from the Branch Honorary Secretary, Mr W. H. Rutherford, FCCS, Assistant Secretary and Librarian, Royal Society of Edinburgh, 22 and 24 George Street, Edinburgh 2.

Transport Statistics

The Aslib Transport Group plans to hold a one-day conference on statistics, their availability, compilation and use, from 10 a.m. to 5 p.m. on Thursday 2nd November at the headquarters of the Society of Motor Manufacturers and Traders, Halkin Street, SW1 (off Belgrave Square). The emphasis of the meeting will be on sources available, and the compilation and use of statistics with special reference to the transport field. A small exhibition of relevant material is planned. Speakers asked to present papers include: P. R. Smethurst (Greater London Council Planning Dept.); P. L. Fidgeon, Statistical Officer,

and H. C. Boyle, Shipping and Transport Secretary (both of SMMT); L. L. Gordon, Deputy Director, Economist Intelligence Unit, and Miss J. M. Harvey, Loughborough School of Librarianship and formerly Statistics and Marketing Information Librarian, Board of Trade. There will be a special lunch at the 'Victoria' Restaurant for those who desire it, and the fees will be £1, or £2 with the lunch. Inquiries please to the Programme Secretary, K. C. Walker, Lyon Playfair Library, Imperial College, 180 Queens Gate, London SW7.

Tape Typewriter at Aslib

Aslib has acquired a Vonamatic 'P' tape typewriter for research and educational purposes. The Vonamatic produces eight-channel CDC-coded tape, and has at present one reader and one tape-punch, although provision has been made for the addition of auxiliary punches and readers. Edit and control facilities are effected by operational codes on the read tape and by a switch panel, and can be added to or varied without difficulty. The tape produced is compatible with the IBM 870 Document Writing System, the installation of which was notified in *Aslib Proceedings*, vol. 18, no. 3 (March 1966).

Comparative Index to Periodical Prices

B. H. Blackwell Ltd, the Oxford booksellers and periodical agents, have for the second year running produced an index to periodical price increases. The complete figures and the accompanying article appear in the August 1967 issue of the *Library Association Record*, but as these figures appear to have been missed last year by some Aslib members the totals are reproduced here. The complete statistics are broken down into sixty subject divisions. Mrs W. I. Veasey, of B. H. Blackwell Ltd, hopes to have offprints of the complete article available in September.

TOTALS: ALL SUBJECTS

Journals priced between 10s and £25

Subject	*No. of titles*	*Average price* 1967	% *increase on* 1966	*Increase on* 1965 (100)
Humanities and Social Sciences	683	£3 9s 11d	8.0	113.2
Medicine	195	£6 19s 1d	9.7	116.5
Science and Technology ..	849	£6 13s 5d	7.9	112.9
Total/Average	1,727	£5 8s 11d	8.2	113.4

All prices

Subject	*No. of titles*	*Average Price* 1967	% *increase on* 1966	*Increase on* 1965 (100)
Humanities and Social Sciences	690	£3 16s 7d	9.3	115.4
Medicine	200	£7 10s 6d	9.2	116.7
Science and Technology ..	914	£10 8s 7d	12.3	118.7
Total/Average	1,804	£7 11s 8d	11.3	117.7

ANALYSIS BY COUNTRY OF ORIGIN

Journals priced between 10s and £25

Country	*No. of titles*	*Average price* 1967	*% increase on* 1966	*Increase on* 1965 (100)
Great Britain	784	£4 16*s* 2*d*	8.8	115.5
USA and Canada	517	£6 5*s* 2*d*	8.8	112.2
Other countries	426	£5 14*s* 10*d*	6.4	111.9

Library and Information Research

Starting with the 1968 issue, the Library Association *Year Book* is to carry a brief listing of the major library and information research projects in progress in this country, together with a note of projects recently completed. General information on current research is not readily available in a convenient form, and the Association hopes that this listing, while perhaps imperfect as a medium of dissemination, will nevertheless do something to fill the gap.

All institutions and individuals known to be engaged in major pieces of library and information research have already been circularized with a request to supply certain basic details of their research for this listing. It may well be, however, that some have been overlooked, and any reader engaged in such research who has not received a form is asked to get in touch with the Research Officer, The Library Association, 7 Ridgmount Street, London WC1, as soon as possible.

The Information Scientist

Members may be interested to know that Mr Kerr-Waller's paper on 'Evaluation of large-scale information dissemination by AIDS', given at the joint meeting of Aslib and the Institute of Information Scientists in February, is to appear in the September issue of *The Information Scientist*.

The Information Scientist, which replaces the earlier *Bulletin*, was first published in July this year. The editors stress that, although it is the journal of the Institute, it is not limited to papers given at Institute meetings. They hope that the new design (an attractive A5) will encourage members to submit a regular flow of high quality articles.

The Information Scientist is issued three times a year at a subscription of 30*s*.

October Evening Meeting

Mr Victor Feather, the Assistant Secretary of the Trades Union Congress, will speak at an Aslib evening meeting on 26th October on the role of information service in industrial disputes. The chair will be taken by Mr K. D. C. Vernon, Librarian at the London Graduate School of Business Studies. The meeting will take place at the Royal Aeronautical Society, 4 Hamilton Place, at 5.30 p.m. Tea will be served from 5 p.m.

Two Further Educational Courses

Owing to great demand, it has been decided to repeat the Junior Introductory Course in London beginning on 14th November 1967. Those who have already made application need not do so again.

The Business Information Course, held first in June last year, will be held again at Aslib Headquarters on 8th and 9th November. The course aims to introduce students to the most important sources of business information and to demonstrate their exploitation in a small information unit or library. Early application is advised and should be made to the Education Officer.

THE LOGIC OF CO-ORDINATE INDEXING

J. L. JOLLEY
J. L. Jolley and Partners Ltd

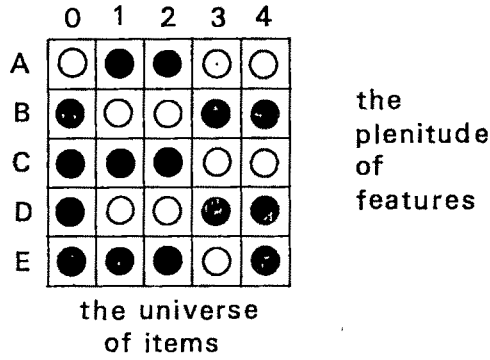
Co-ordinate Indexing Group, Tuesday 13th June 1967

THE fundamental structure which is dealt with in all information handling is the data field—the set of things or items with which we are concerned, together with the set of qualities or features which make these of interest to us. It is an extremely important, and deceptively simple structure. Since co-ordinate indexing forms a large part of information handling, we may deduce that its practitioners know a good deal about the data field in fact, no matter what they may think about its theory. Indeed, here as elsewhere facts come first and theories toddle after, explaining why we might have expected the behaviour which surprised us. The theoretician seems a professor of glorious hindsight, hoping that what he says will be helpful to people facing the other way.

The items and features of a data field are connected by a relation which does not appear in the textbooks on logic—reciprocal membership. An item is a class of features, the features it possesses; reciprocally, a feature is a class of items, the items which possess it. This way of speaking feels quite natural: it is obvious that any recognisable item possesses the features by which we can distinguish it from others. Yet the remark is biassed. It takes an item viewpoint. From a feature viewpoint, the features are the owners, the items are their possessions. Both opinions are equally valid; the idea of reciprocal membership brings out this symmetry.

Since no symbol for reciprocal membership is found in the literature of our subject, we must invent one. The mark X may suit. Then if Jack is tall we may write Jack X tallness, which conveys the same information as tallness X Jack. Our new mark may be contrasted with the established membership symbol of logic and set theory, $\in$; to write Jack $\in$ tallness tells us Jack is a member of the class of those items which are tall, but leaves us to deduce what tallness may happen to be.

At this point it may be useful to display a data field. Here, then, is a field of five items and five features. The items are numbered, and letters are allotted to the features. If an item possesses a feature, a blob is set where the two cross each other; if it does not, a ring is shown. The ring is necessary because without it the crossing would be blank, and we should not know whether the item was truly without the feature, or whether the matter was in doubt.



THE DATA FIELD: RECIPROCAL MEMBEESHIP

A simple data field, with a pattern of present and absent data units chosen to act as an illustration to the argument given in the text.

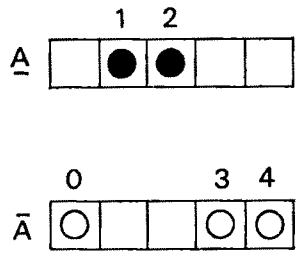
Present data units are instances of the relation of reciprocal membership of present terms; they are shown as blobs. Absent data units are instances of this relation between absent terms: they are shown as rings.

Using $\bar{\times}$ to stand for reciprocal membership, a bar for absence and an underline for presence, the data field shows (for example) that $\underline{A} \bar{\times} \underline{2}$ and that $\overline{C} \bar{\times} \overline{3}$. The relation code of reciprocal membership is 1010. This is the same as the code for multiplication. It is to be noted that the number of instances of reciprocal membership (the number of data units) in the field is the number of members of one set of terms (items) multiplied by the number of members of the other (features).

Since, in this diagram, both blobs and rings are equally positive, it seems that the letters and numerals must refer to both. If the blobs in row A show the items (we may take them to be people) who are artful, then the rings must display those who are artless. The letter A, the name of the row, refers to a pair of features, a binary feature (we may call it an ambifeature), and it seems we must find a way of telling to which of the pair we refer. This we may do by placing a bar over the letter if it represents one of the pair, and by underlining the letter if it stands for the other. By convention, the underlining corresponds to a present feature, which is shown by means of a blob, and the bar corresponds to one which is absent and is shown by a ring. Exactly the same argument can be applied to items. Jack, for example, has present features and absent features—qualities he has, and qualities he has not. With the bar and underline convention, we may say that $\underline{\text{Jack}}$ is a unary item, consisting only of the features present in him, and that $\overline{\text{Jack}}$ is another unary item, consisting of the features which are absent. The two together comprise the ambiitem, Jack, which is binary.

Absence and presence are examples of a special type of relation which we may call a condition. It is a passive relation, like overlapping or being-at-right-angles-to. There is also an active type of relation, which is generally called an operation; the operation to be considered when presence and absence are concerned is complementation. This is a well-known process. It consists of switching attention from presence to absence, or the reverse. Various symbols are in use for it. We may choose the lemma, $\sim$, and write $\sim\underline{A}$ to mean com-

plementing $\underline{A}$. The result is, of course, $\overline{A}$. Referring to our data field, this means switching attention from items 1 and 2 to items 0, 3 and 4. Here a word of warning is in order: many textbooks use the same symbol both for the operation and for its result. Entirely forgetting the existence of absence, and working only with presence, they write A instead of what we here call $\underline{A}$, and $\sim$A for what we here call $\overline{A}$. This sort of shorthand is acceptable provided that we recognise its nature. It can be troublesome, however, for it disguises the pattern of the subject.



ABSENCE, PRESENCE AND COMPLEMENTATION

Features name sets of items: these two features ($\underline{A}$ and $\overline{A}$) taken from the data field, show the present and absent parts of the ambifeature A, which itself is binary and is made up of the sets of items 1, 2 and 0, 3, 4.

The conditions (passive relations) of presence and absence can be related by the operation of complementation, which moves our attention from one to the other (for example, from 1, 2 to 0, 3, 4). Only one sign is used for this operation, but the argument might be simpler if two were employed since complementation can work in two ways: in one case it is applied to a present set and in the other to a set which is absent. In other cases, in logic and set theory, this is done.

When sets of items (in the universe) are complemented from presence to absence, we think of the feature concerned (in the plenitude) as being negated. We move, for example, from 'clever' to 'not-clever'.

Using the sign $\Rightarrow$ to mean 'results in', we may write $\sim A \Rightarrow \overline{A}$, to mean that complementing the set known as $\underline{A}$ produces the set known as $\overline{A}$.

The pattern of the subject is worth a paragraph to itself. It is perhaps obvious that the more clearly it is displayed, the more easily it is learned. There is, however, a more important reason for pedantic clarity in information handling, if we can achieve it. This is, that every system for indexing, every method of manipulating knowledge, is based on mimicry. The better a system imitates the pattern of its subject, the more effectively it works, the less trouble it gives, the more power it offers its users. It so happens that the structure of the data field is repeated, with increasing complexity, at each of the many integrative levels we find in the world around us: at the level of shape, or geometry; at that of particle physics; at the chemical and the two biological levels, and at those of communities and nations. If this repetition did not occur, we could use neither mathematics nor logic, as we do every day, to help us deal with the problems of work and of recreation. This is why insistence on the pattern is severely practical. It is why we can study a maker's

output of grand pianos by shuffling cards, instead of by marshalling the instruments on an airfield by means of a fork-lift truck.

To return to the diagram: if we look at features $\underline{A}$ and $\underline{B}$ we can see they are mutually exclusive. No item possesses both. They are also collectively exhaustive, since no item possesses the complement of both—no item can be described as both $\overline{A}$ and $\overline{B}$. So far as the field is concerned, $\underline{B}$ is the same as $\overline{A}$. An example is afforded by 'male' and 'female' as these terms might appear in a personnel record. Let $\underline{A}$ signify 'male'. Then $\overline{A}$ is 'not-male', $\underline{B}$ is 'female' and $\overline{B}$ is 'not-female'. When two or more features are mutually exclusive and collectively exhaustive, they form an array, and effect a partition of the items in the field. In the present cause the partition of items produces the subsets 1, 2 and 0, 3, 4 out of the full set made of every available item. This full set is sometimes called the universal set or universe. The one-way thinking which emphasises membership as opposed to reciprocal membership here results in a time-hallowed name for all the items being accompanied by no name whatever for all the features. It is worth making use of the word 'plenitude', as a companion to 'universe', signifying all the features with which we are concerned.

	0	1	2	3	4
A	○	●	●	○	○
B	●	○	○	●	●

SEPARATENESS (SEPARATION); MUTUAL EXCLUSION

The sets of items known as $\underline{A}$ and $\underline{B}$ are separate, with no common member. The features which name them are mutually exclusive, this being the effect, in the plenitude, of separation in the universe. A useful sign for such separation is $\parallel$: we may write $\underline{A} \parallel \underline{B}$. Separation is often known as disjunction, but the latter name has not been used here because it is also applied to the logic of statements, where its meaning is not quite the same.

It is interesting that the relation code of these ideas is 0010, the same as the code for addition. To add things together, they have to be separate to begin with.

When we know all the features in a set of such are mutually exclusive, we know it is safe to apply a subcode to them. The essence of a subcode is to use a small number of things, assembled in different ways, to represent a large number. As an example we may take a co-ordinate index embodied in punched feature cards, books being the items and authors the features. There may be several hundred authors; to prevent this calling for several hundred cards, a mere twenty-six may be used, each known by a letter of the alphabet. These may be taken in pairs. Three hundred and twenty-five such pairs can be formed, each representing an author. Part of this subcode may read:

WX ..	Beaumont				
WY ..	Jonson	XY ..	Marlowe		
WZ ..	Dekker	XZ ..	Lyly	YZ ..	Fletcher

These features are not mutually exclusive in their context: for example, Beaumont collaborated with Fletcher. To index 'The Knight of the Burning

Pestle' both WX and YZ must be employed—four cards which between them contain the letters to stand for Jonson, Marlowe, Dekker and Lyly as well as for the true authors of the work. As a result, a search for books by Lyly, or Dekker, or Marlowe, or Jonson—or by several of these in collusion—will yield 'The Knight of the Burning Pestle' as an incorrect answer.

Safety in subcoding is not the only advantage arising from sets of items being separate—that is, possessing mutually exclusive features. Another is the possibility of setting up a check procedure for feature card coding and punching. To show this, we may imagine that our index records the year in which a book was first published. Every book has one, and only one, year of first publication; so the features are not only mutually exclusive but also collectively exhaustive. The disjoint sets of items form a partition of all the items of the field. To carry out the check on this partition we take a feature card of a different colour from that of the standard cards of the pack, and place it on top of the first card to be punched. The two cards are punched together; the check card is then placed on top of the card which represents the next of the years of publication. Holes passing through it show the positions held by items already indexed; since these cannot be used again, a coding instruction to do so is either a mistake or an indication that a mistake has already been made. When punching the feature cards for the years is complete, any unpunched positions in the check card show items which have been omitted: reference to these, and rectification of the fault, is then all that is required.

Another activity which is possible with collections of separate sets is the formation of a hierarchical classification. The features forming the arrays of such hierarchies must be mutually exclusive and collectively exhaustive or they will not do their job of ensuring there is always one place, and one place only, for each item in each array. A similar effect is found in the design of questions for research surveys, where the features appear as the replies. The well-known array 'yes—no—don't know—no answer' is an example.

Within a data field, any set of items or features may turn out to be a subset of a larger set, unless the set is already the largest available—the universe or the plenitude. In general set theory, even these latter cases are not excepted, for a set is allowed to be a subset of itself. As a result, the words 'set' and 'subset' may be used interchangeably, as in this account, unless special circumstances warrant a distinction. To be a subset of itself is a reflexive relation, a relation a thing can bear to itself without any call for any second object to exist. It is one of a number of important properties which relations may possess. Another is symmetry. Symmetry is a property calling for at least two entities before it can occur. The relation of separation between sets, which we have just been examining, is symmetric: if set $\underline{A}$ is separate from set $\underline{B}$, then set $\underline{B}$ is separate from set $\underline{A}$. Separation, however, is not reflexive. A set cannot be separate from itself.

A further relation occurring in the data field is overlap. It may be given the symbol $\bar{\times}$, though currently this is not widely used. If we refer again to the sample field of five items and five features, we can see that overlap obtains between $\underline{D}$ and $\underline{E}$: items 0 and 4 are common to both features. Overlap is a symmetric condition, and is also reflexive: if $\underline{D}$ overlaps $\underline{E}$, then $\underline{E}$ overlaps

	0	1	2	3	4
D	●	○	○	●	●
E	●	●	●	○	●

UNION, OVERLAP, INTERSECTION

The sets named D and E in our data field overlap: we may write D⋇E. When there is overlap, sets can be intersected and the result is not nothing: at least one item can be guaranteed to appear in the intersection. In this case, intersecting D (0, 3, 4) and E (0, 1, 2, 4) produces 0 and 4—typical of a search carried out by stacking punched feature cards. We may write D ⋇ E⇒0, 4.

The operation of intersecting sets unites their complements: out of all the items considered, 1, 2 and 3 are left when 0 and 4 are taken away; and the operation of uniting sets $\overline{D}$ and $\overline{E}$ produces this set which is left: the set consisting of items possessing features $\overline{D}$ or $\overline{E}$ or (not here shown) both. We may write $\overline{D} \cup \overline{E}$⇒1, 2, 3.

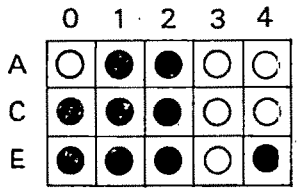
In the plenitude, union of features accompanies the intersection of sets of items in the universe. Thus, to describe the set made of items 0 and 4 we use the joined-together feature 'DE' (for example: '0 and 4 are the tall-dark men'). Similarly, union of sets of items is accompanied by intersection of sets of features. In following this argument care should be taken, since we are so used to talking of a 'feature' when we mean the set of items which possess it.

The relation code of all these closely-related ideas is 0011.

D, and both of these obviously overlap themselves. If sets of items overlap each other (we often name the sets by their features, and say 'if features overlap') then the operation called intersection can be carried out. This is the fundamental operation of co-ordinate indexing. Whenever we stack punched feature cards we intersect sets of items, represented by the holes. Like overlap, intersection is symmetric and reflexive: its symmetry is clear from the fact that we obtain the same pattern of holes, no matter which of two stacked cards is uppermost.

Intersection is provided with a well-established symbol: ∩ . It is normally considered together with the operation of union. The union of two sets is the set composed of members of one or the other or both. Its symbol is ∪. If two stacked feature cards are held against a brilliant light, so long as the cards are not absolutely opaque, the union of the two sets of items appears as the through holes together with the dimmer lights of the perforations which are in one card but not the other. The union of two sets is not often a search requirement in a co-ordinate index; but it can happen by mistake, so to speak. The trouble we met in recording Beaumont and Fletcher by means of a subcode arose because the two different pairs of features (W, X and Y, Z) were united to form W, X, Y, Z against one single item. In this case, the union occurred between sets of subfeatures as opposed to between sets of items; but we must expect all the operations we can carry out on a data field to work in both its extensions.

If we now look at features A and C in our data field, it appears that set A is included in set C. Further, set C is included in set E. Thus, if an item is A (for instance, if a cookery book is about allspice) it is C (about condiments);

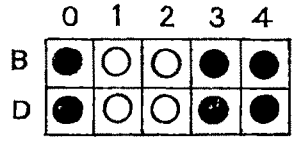


INCLUSION

If E properly includes or contains C we may write E ⊃ C; here the effect E ⊃ C ⊃ A is shown. The complements of these sets possess the reverse property: $\bar{A} \supset \bar{C} \supset \bar{E}$. The inclusion sign is often reverted, and read 'is included in', so that if C is included in E we write C⊂E. The same effect is found in the case of the arithmetic signs for being greater and being less, which have the same relation code as does proper inclusion: namely, 0100. Subtraction also has this code. In the plenitude, the idea of inclusion appears as the idea of being more generic, or more specific, than some other feature. In this example, E is the most generic, covering most items, if the present features are taken; $\bar{A}$ is the most generic of those which are absent.

if it is about condiments it is about eatables. The symbol for inclusion is ⊃ ; we write C⊃A to show that set C includes set A. Proper inclusion, as it is called, is not reflexive: a set cannot properly include itself; it is not symmetric (if C includes A, then A does not include C); but though the condition does not have these properties it possesses an attribute we have not yet encountered in the data field. It is transitive. If E⊃C and C⊃A we may deduce that E⊃A.

Inclusion is widespread in co-ordinate indexes. An example is afforded by the generic-specific relationship; another is found in groups of features which overlap in one direction, such as 'more than 10', 'more than 20' and 'more than 30'. Cumulative series of features of this type appear in technical documentation, when the properties of materials or other items are recorded. Often, a rule of the form 'if the item is P, punch also Q' shows that inclusion is concerned.



Features B and D in our example show a relation of equivalence. So far as the field is concerned, there is no difference between them. A search for all items in the set defined by the one produces the same collection as a search for those possessing the other. This is the effect produced by a pair of synonyms, if each is fully treated. Often, however, it is hidden: one of a pair of synonyms is applied to some of the items in the field, and the other is applied to the remainder. Chasing synonyms can become a nightmare: when they are shared amongst the items of an index no amount of stacking cards and looking for identical patterns will find them.

If we list the relations already encountered in these notes, we find no less than eleven of them: absence, presence, inclusion, union, intersection, equivalence, overlap, complementation, membership, reciprocal membership, separation. The list is by no means complete, but is enough to show the complexity of our subject—the more so when we recall that these are all to do with logic, and that arithmetic has a part to play. Addition, subtraction, multiplication, and other conditions and operations of statistics may be exemplified by the data field also.

It is relevant to deal with these relations of arithmetic in the context of co-ordinate indexing, since every feature is not only a particular set of items, but also a particular number of them (and transversely, every item is a set and a number of features). Further, every feature can be taken as a ratio, relating the number of items possessing the feature to the total number in the universe. In our sample field, for instance, E is four-fifths and A is two-fifths of the total. The statistician works with these ratios (and when he takes the total of his population for granted he works with the bare numbers). The effect is most clearly seen with punched feature cards if the holes in them are thought of as a density, an indication of the chance of finding an item with the feature concerned if the item is chosen at random. Stacking two such cards not only intersects the two collections of items they represent: it also (if the features are not associated with each other) multiplies the chances they display. Thus two independent features, each occurring in one half of the items indexed, should produce a stack in which one quarter of the positions carry co-incident holes. Here, in the realm of numbers, is an interest to which the indexer may turn if sets and subject-matter bore him. It is the realm of the sociologist, the management accountant, the student of probabilities.

There is as much to be said about these mathematical aspects of the data field as there is about set theory. Densities may vary in many ways across the face of a feature card, and between cards which are superimposed in register; cards may be given monetary or other values for accounting or statistical purposes; special random-punched and other statistical feature cards may be prepared for mathematical uses. Here, however, this aspect of co-ordinate indexing must be compressed into a few paragraphs only, mainly to put the set-theoretic aspect—the unions, complementations, intersections, overlaps and the rest—into perspective. The logic, thought of as the rules for manipulating the sets and numbers, embraces both of these.

To display this situation, a layout of relation codes may be employed. These are created by using properties already mentioned—transitivity, symmetry and reflexiveness—in that order. Thus the code ooo means that a relation is not transitive, not symmetric, and not reflexive; the code 111 means that it is all three. To construct the layout, relations are divided into four types by means of two pairs of ideas: they are either to do with sets, or to do with numbers (this is the pair which contrasts identity and quantity), and they are either passive or active (this is the pair which contrasts conditions with operations). The quantitative relations are those to do with arithmetic; the identitive are to do with set theory. A small problem of nomenclature arises because the mathematician often calls an operation 'commutative' instead of 'symmetric',

'idempotent' instead of 'reflexive', and 'non-associative' instead of 'transitive'. Here we have one of the many cases of two related disciplines growing up separately and giving different names to the same ideas.

Before displaying the code, a few words are in order, concerning reciprocal membership—the condition with which this account began. It possesses another property besides being intransitive, symmetric and irreflexive. It is what we may call transversive—it relates one set of terms (features) to a transverse set of terms (items), as can be seen by a glance at the data field. To call both features and items by the name 'terms' may seem unusual to some practitioners of co-ordinate indexing, since at least one tradition in the realm of librarianship restricts the name 'term' to the meaning here labelled 'feature'. On the other hand, all the standard textbooks on logic make it clear that a term may be either substantive or adjective—either item or feature—and it seems well to

	entitive: to do with sets		attributive: to do with numbers	
Code	passive: condition	active: operation	passive: condition	active: operation
0000	absence	complementation		
0001	presence			
0010	separation			addition
0011	overlap	{union, intersection}		
0100	proper inclusion		{greater-than, less-than}	subtraction
0101				
0110				
0111	equivalence		equality	
1000	membership			
1001				
1010	reciprocal-membership			multiplication
1011				
1100				division
1101				
1110				
1111				averaging

stay in the main line of development. Incidentally, this gives us another contrast—between the idea of a term and that of a relation.

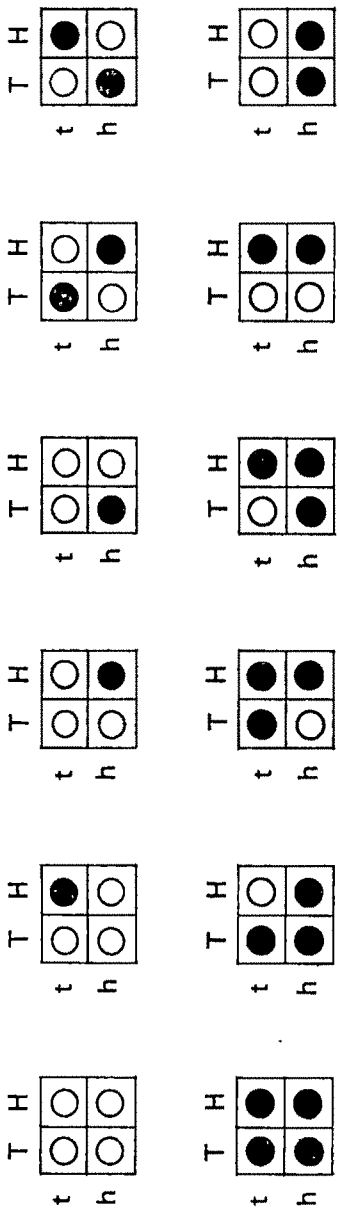
To return to transversiveness: if this, too, is admitted to the relation codes, they achieve a four-digit notation, the first showing whether the relation concerned is transverse or not. Sixteen relation codes become possible: here they are, with just a few of the relations noted against them.

The large number of gaps in this table shows the vast amount of the subject with which this account does not deal. Much enjoyment can be had, by those with cross-word-puzzle minds, filling in the spaces. For example, the operation of forming a symmetric difference has a place; so has forming the Cartesian product. Interesting patterns appear in the display of relation codes, also. Thus the addition-subtraction pair, which are not transversive, reappear as multiplication-division when transversiveness is added.

Thus the logic of co-ordinate indexing appears as the set of rules which governs the data field, affecting all the conditions and operations in the table of relation codes. If we can tell the conditions which obtain between features (taken as sets of items) then we can tell how we may expect them to behave. This can give a useful degree of control over vocabulary, a control which is not available to those who set up a keyword list, referring to a set of features, without putting the features into classes and groups of similar terms and noting their habits according to the relation code they possess.

It is natural to ask; will the adjunction of yet another property of relations, possessed by none of those mentioned hitherto, enable code-making to continue, so that (for instance) 1111 may be rewritten 01111 and followed by some new relation with code 10000? The answer is yes. The new property required for the purpose is completeness; its effect is to introduce ideas analagous to space. So far as attributes are concerned, the conditions and operations of this higher level include vector spaces and subspaces; on the entitive side geometric shapes appear as the objects on which the operations are performed and to which the conditions apply.

There are sixteen relations between 10000 and 11111; they form what is called an 'integrative level'. This may be thought of as the spatial, or geometric, level, just as the first set of sixteen (from 00000 to 01111) may be thought of as comprising the level of sets or numbers. The sixteen relations in each level are obviously themselves in a simple order: each may be considered as typical of a formative stage within its level. The idea of a formative stage arises because each higher relation may be defined in terms of the lower relations which precede it and are used to form it. To show this, at the expense of seeming to play with words, we may define the first five entitive conditions: absence, presence, separation, overlap and inclusion. We start with absence, and use it twice: the absence of absence is presence. Next, using absence and presence, we define separation as the condition which obtains between them. In our data field, for example, the absent and present parts of the ambifeature A form two separate subsets of the set of items. Next, we take overlap: it assumes presence, and also the absence of separation. Inclusion, in its turn, is defined: it is the relation between a present set and that set's overlap with any other set.



THE LOGIC OF STATEMENTS

These twelve small data fields show T (Tom) and H (Harry) as items, related to t (tallness) and h (handsomeness) as features. They are the twelve which are compatible with the statement 'If Tom is tall, then Harry is handsome'. There are four more possible ways of arranging blobs and rings in a 2 x 2 data field, but all of them show Tom as tall and Harry as ugly, and so are ruled out.

This shows how the relation of implication (usually shown by a single arrow) operates in the data field: it tells us which fields are not the case, and so helps to describe a situation to us. If we take it that a statement does not imply itself, then the required code is 1100. Other relations occurring in the logic of statements may be treated similarly. Quite a small number of statements will reduce a data field to one single permitted pattern, and some simple sets of problem-solving cards have been devised to take advantage of the effect. Not unlike feature cards, they superimpose patterns of holes, each representing a permitted situation.

Once the appetite is whetted, it may demand further properties for the relation codes: the addition of a sixth, whatever it may be, will produce thirty-two extra types of relation. This, on the principles just laid down, amounts to two integrative levels. Intuitively, we may expect time to appear, with mass and energy to accompany it. This is indeed what seems to happen: the two abstract levels are followed by a subatomic and a molecular level, whose entities and attributes are held together by relations concerned with energy and time. This is not science fiction: the remark is prompted by observation of the behaviour of physicists. When they have analysed matter down to the smallest quantum of energy and cannot break it down further, they proceed to describe affairs in terms taken from the most complex stages of the geometric level—of vector and tensor analysis. In this account of co-ordinate indexing, we are simply crossing the same barrier in the other direction.

Like our brief excursion into mathematics, this glance at the behaviour of integrative levels must be brief. After the arrival of the time-mass-energy property, any further property will generate sixty-four new relation codes, four new integrative levels. Again, this seems to occur: the new property comes at the top of the molecular level, where the most complicated configurations of atoms build up into living forms. Here the biochemist looks at the elements of life, and the integrative levels containing living things begin. After the set of ideas ascending from organelles through living cells, the cellular level, a set of sixteen concerned with the whole plant or animal appears; after this 'biomorphic' level, levels of communities and of nations occur. It is pleasantly satisfying to note that the set of available codes ends neatly at a position corresponding to supranational authorities.

If an apology is needed for this excursion into matter theory, it is afforded by the relations in the lowest level of all. These may be used to represent all the ideas of everyday life, with which the higher levels are concerned, quite simply *because they have the same pattern.* We have already noted the cardinal principle of information handling, that the better the handling mechanism copies the pattern of its subject, the more effective it will be. The arrangement of level o, the set-theoretic level, is therefore of crucial value.

Thus the theory of integrative levels is another subject which the student of co-ordinate indexing may decide to explore, if the study of numbers and its accompanying mathematics does not excite him.

There is room for only one further aspect of our topic: for this, a return to the practicalities of codes and subcodes is required. Many ideas ago, we applied a digraph subcode to six Elizabethan authors. It generated crossovers, false drops, wrong answers. The same effect is found when features of textual matter have to be indexed against publications. To index a work on the manufacture of bubbles in oil by means of bicycle pumps will lead to that document ('oil', 'bubbles', 'manufacture', 'pumps', 'bicycles') appearing as an answer to a search for bicycle pumps made of bubbles—if such a search is ever undertaken. Of course, a search of this type is ludicrous. The ideas concerned are so very likely to combine in the obviously sensible, practical way that in this extreme case the problem vanishes. Things must not be pushed to extremes, however, for in the unglamourous mean the trouble is generally with us. Most indexers of subject

matter have met it; and many have devised useful methods of reducing or ending it. The idea of a role, for instance, making clear the part played by the bicycle pump (as an agent) derives from this situation. So does the refusal to break up a so-called 'monadic feature' (bicycle pump) into two parts, which may then combine incorrectly (oil pump). A related problem has led to the use of links—that is, of methods which break a document dealing with several subjects into as many sub-items as it contains topics. Thus a work on laying bricks and eating eggs does not appear as a work on laying eggs and eating bricks because the two activities are given different link numbers (thus: laying-1, bricks-1, eating-2, eggs-2), and a rule is made that features bearing link 1 shall never combine with features bearing link 2. Some careful mechanism or other is then designed, to put the rule into effect.

These problems in the realm of indexing direct meanings are like those to be met in subcodes because all codes and subcodes form a part of a single continuum. It may be called the semantic continuum, semantic because it is concerned with the representation of meaning. It has a unit point, a place in which

THE SEMANTIC CONTINUUM

The zero point of the semantic continuum is here shown at the left-hand side of the range of subcodes; it corresponds to the binary system used in computers and in related automatic data processing machinery: the hole or other mark is either present or absent. In the subcode range above this, the question is 'which of the characters of the subcode is present?': in the text, Dekker is meant when W and Z are present. The unity point is that of the most generic everyday meanings. The continuum proceeds to infinity in both directions.

we may fit all the most generic terms we use; above that point, assemblies of terms becoming more and more specific are to be found. Thus if 'human', 'masculine' and 'juvenile' fit at the generic point, the idea 'boy' fits higher up—we may think of it as corresponding to the number three, being made of three units. Below the generic point, between this and zero on the continuum, lie the subcodes. No element of a subcode represents a meaning: they are all mere parts of meanings. Thus, in our subcode of authors, the symbol W by itself carries only half an idea. Earlier, we called it a subfeature, not a feature. Another half (say Z) must be attached to it before it achieves significance: WZ is Dekker.

The arrangement is called a continuum because it is always possible to insert a code or a subcode between any two codes it contains. As a simple example, the symbols W and Z form a subcode-reference to Dekker; but on a length of punched or magnetic tape, or on an eighty-column tabulating machine card, they would themselves be represented by symbols, patterns of holes and blanks. These patterns are then a subcode for a subcode. Further, between letters and whole words we may insert any number of syllabic codes.

The importance of the semantic continuum is, once again, that it provides a means of solving problems. If we are meeting difficulty at the level of everyday meanings (for example, crossovers in an index with one feature card per idea), then we may find out why this is occurring by a study of the behaviour of sub-codes.

However, it is time to bring these notes to a close. Their content may be summarized: the co-ordinate indexer uses a pattern found at the lowest integrative level to represent the ideas of higher levels which he must record. This pattern is made up of sets—of items and of features—related to each other; and the logic of co-ordinate indexing governs the work which may be carried out on these. The pattern is very rich, and well worth studying. Everyone concerned with information handling uses it (or a part of it), and in virtue of his craft may be taken to wish to know more of it. Certainly the preparation of this paper has shown its author how pleasant it would be to know more, and if it conveys this feeling to others it has succeeded in its aim.

NOTES AND REFERENCES

For logic, W. V. O. Quine's *Methods of logic* is an excellent book; Robert R. Stoll's *Sets, logic and axiomatic theories* is tough but well worth reading, and Irving Adler's *The new mathematics* gives a simple but thorough treatment of the basis of number theory. The theory of integrative levels is nowhere fully treated, but an account is to be found in J. K. Feibleman's 'The integrative levels in nature', printed in Aslib's *Focus on information and communication*. The account is not so exactly patterned as the one given in this paper on the logic of co-ordinate indexing, and it omits the fundamental set-theoretic and geometric levels entirely; nevertheless it provides a great deal of insight into the subject. For a background, Stephen Toulmin and June Goodfield's Penguin, *The architecture of matter*, is excellent, and Oliver L. Reiser's *The integration of human knowledge* is a most interesting study. For those who would like to proceed into the mathematics of the subject, R. G. D. Allen's *Basic mathematics* is a good book to possess, and Mansfield and Bruckheimer's *Background to set and group theory* is recommended. In this latter work, the idea of a 'condition' (as opposed to an 'operation') is named a 'relation', thus leaving a gap in the language, no word being used to cover both. This is not unusual in works on mathematics, and the reader should beware of it. However, the nomenclature of our subject is well-known to be fraught with inconsistency. This is natural, for it is only just beginning to come together out of many different parts, each of which is consistent in itself and of considerable standing.

DISCUSSION

Mr G. M. Boyd (Lloyd's Register of Shipping) asked whether Mr Jolley would agree that an effective co-ordinate index could be made without detailed knowledge of its logic, etc.

Mr Jolley said he agreed. The basic idea of a co-ordinate index was simple and, if embodied in a set of punched feature cards, its fundamental structure became more obvious than was the case with, say, tabulating machine cards or computer tape.

Mr A. J. Hallan (Imperial War Museum) asked how one could tell when one had encountered an idea which fitted at the generic point in the semantic continuum, and how this continuum related to the set of integrative levels.

Mr Jolley: As a beginning, one might look at a dictionary and see how it defines the various ideas whose names it lists. In my example, for instance, it breaks down 'boy' into 'man-child'; and if we look at these elements in turn we find it defines 'man' as 'human male' and 'child' as 'young human being'. If we now look at 'young' and 'human being' and 'male' we find that each is defined (if that word may be used) by means of a synonym we are already supposed to understand. All such trains of definition end either in this way or in the provision of a structural definition, an analytic description concerned with bodily make-up. Other examples are afforded by the description of a chemical substance in terms of its formula and the positions of its constituent atoms, and by the description of an industrial Company in terms of its sections and departments. At this point, where definition simply must become analytic, the fully-generic terms are met.

The link with the holotheme, as the set of integrative levels may be called, may be thought of as orthogonal: the continum crosses the holotheme at every stage, and in particular at whichever stage one is working. Ideas of all degrees of specificity may be subcoded, but any specific idea may also be represented as a number of more generic ideas. In this case, the generics are at the same stage, in the same level, as the specifics; but when generality can go no further we must either continue along the semantic continum into a subcode or drop a stage in the holotheme and resort to description.

THESAURUS CONSTRUCTION AND USE*

A selective Bibliography based on Material in the Aslib Library in July 1967

Compiled by
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ARIES, PHILIPPE. Un lexique par phrases descriptives. *Bulletin de l'A.I.D.*, vol. 5, no. 4, 1966, p. 99–101.

ARTANDI, SUSAN, *and* HINES, THEODORE, C. Roles and links, or forward to Cutter. *American Documentation*, vol. 14, no. 1, January 1963, p. 74–7.

BAKER, K. J. Unit concept co-ordinate indexing. The cost of setting up and operating a system. *Northern Aslib Bulletin*, vol. 11, no. 4, October/December 1966, p. 3–27.

BAUER, GERD. Anwendung des Prinzips der Facetten-klassifikation für den Aufbau von Thesauri. [Use of the principles of faceted classification for compiling thesauri.] *ZIID-Zeitschrift*, vol. 14, no. 3, June 1967, p. 72–83.

BAUER, H. Aufstellung eines Thesaurus für Elekrotechnik mit Hilfe von Maschinenlochkarten. [Compilation of a thesaurus for electrical engineering with the aid of machine punched cards.] *Nachrichten für Dokumentation*, vol. 18, no. 1, February 1967, p. 6–12.

BELLPORT, B. P. Bureau of Reclamation thesaurus of descriptors. *Bulletin de l'A.I.D.*, vol. 5, no. 4, 1966, p. 53–7.

BLOOMFIELD, MASSE. Simulated machine indexing. *Special Libraries*, vol. 57, 1966. Part 1. Physics Abstracts subject index used as a thesaurus. No. 3, March, p. 167–71. Part 2. Use of words from title and abstract for matching thesauri headings. No. 4, April, p. 232–5. Part 3. Chemical Abstracts index used as a thesaurus. No. 5, May-June, p.323–6.

BRENNER, EVERETT H., *and* MULVIHILL, J. G. American Petroleum Institute information retrieval project subject authority list. *Bulletin de l'A.I.D.*, vol. 5, no. 4, 1966, p. 81–4.

BRENNER, EVERETT H. The control of quality; or back to quality, not "Forward to Cutter". *In* CONFERENCE ON TECHNICAL INFORMATION CENTER ADMINISTRATION, 2nd, St. David's, Pa., June 14–17, 1965. TICA 2. [proceedings] . . . Macmillan, 1965, p. 91–100.

* It is proposed that this bibliography will be updated at regular intervals. Members who wish to receive regular notification of revisions should notify the library so that their names may be put on a mailing list.

BUNTROCK, H. Zur Kompilation von Thesauri. [Brussels], Euratom, 1964. 16 p. tables. (Eur 558.d. reprint). Reprinted from IBM World Trade European Education Center, proceedings, November 1962, Blaricum, Holland.

CAMPBELL, D. J. Making your own indexing system in science and technology (classification and keyword systems). *Aslib Proceedings,* vol. 15, no. 10, October 1963, p. 282–303.

CAPONIO, J. F., *and* GILLUM, T. L. Practical aspects concerning the development and use of ASTIA's thesaurus in information retrieval. *Journal of Chemical Documentation,* vol. 4, no. 1, January 1964, p. 5–8.

COSTELLO, JOHN C. Coordinate indexing. New Brunswick, New Jersey, Rutgers State University. Graduate School of Library Service, 1966. ix, 11–217 [6] p. Tables, diagrs. (Rutgers Series on Systems for the Intellectual Organization of Information, ed. by Susan Artandi. vol. VII).

DAHLBERG, INGETRAUT. Thesaurus research: Deutsche Gesellschaft für Dokumentation E.V. *Bulletin de l'A.I.D.*, vol. 5, no. 4, 1966, p. 103–6.

DETANT, MARCEL. Les problèmes terminologiques dans la documentation nucléaire de l'Euratom. *Bulletin de l'A.I.D.,* vol. 5, no. 4, 1966, p. 67–77.

DIJK, MARCEL VAN. Un thésaurus multilingue au service de la coopération internationale. [A multilingual thesaurus towards the work of international cooperation.] *Bulletin de l'A.I.D.,* vol. 5, no. 4, 1966, p. 85–7.

ENGINEERS JOINT COUNCIL. Action plan for improved dissemination of engineering information [by] Eugene Wall: progress report. No. 1. rev. – ; 1962 – . New York. For final report *see* ENGINEERS JOINT COUNCIL. Study of engineering terminology . . .

ENGINEERS JOINT COUNCIL. Rules for preparing and updating engineering thesauri. New York, Engineers Joint Council. 1965. 4 p.

ENGINEERS JOINT COUNCIL. Study of engineering terminology and relationships among engineering terms: final report. New York, the Council: [Washington, U.S. Office of Technical Services], 1963. 16 leaves. diagrs. For earlier reports *see* ENGINEERS' JOINT COUNCIL. Action plan for improved dissemination of engineering information.

GARDIN, JEAN-CLAUDE. Eléments d'un modèle pour la description des lexiques documentaires. [Principles of a model for the description of documentation vocabularies.] *Bulletin des Bibliothèques de France,* vol. 11, no. 5, May 1966, p. 171–82.

GILLUM, T. L. Compiling a technical thesaurus. *Journal of Chemical Documentation,* vol. 4, no. 1, January 1964, p. 29–32.

GILLUM, T. L. Philosophy of and guidance for revision of the ASTIA thesaurus . . . Arlington, Va., Armed Services Technical Information Agency, 1961. 19 p.

GRAF, KARL-CHRISTOPH, *and others*. Erfahrungen und Erkenntnisse bei der Aufstellung von Thesauren. [Contributions to an understanding of the structure of thesauri.] *Nachrichten für Dokumentation,* vol. 15, no. 3, September 1964, p. 118–121.

GRECU, N., *and others*. Experienta în alcatuirea unui vocabular de termeni di chimie fizicá. [Experience in working out a vocabulary of terms in physical chemistry.] *Studii si Cercetari de Documentare si Bibliologie,* vol. 8, 1, March 1966, p. 11–15.

GRECU, N. Tezaurul—un instrument de baza în documentarea stiintifica. [Information retrieval thesaurus—a basic tool in scientific information.] *Studii si Cercetari de Documentare si Bibliologie,* vol. 7, no. 2, June 1965, p. 145–53.

GREER, F. LOYAL. User vocabulary in thesaurus development. Copied from *Perceptual and Motor Skills,* vol. 21, 1965, p. 827–37.

HALKIN, JACQUES E. J. Les vocabulaires documentaires: formation, utilisation et crise de croissance. [Documentation languages: formation, use and problems of development.] *Bulletin de l'A.I.D.,* vol. 5, no. 4, 1966, p. 19–28.

HAMMOND, WILLIAM, *and* ROSENBORG, STAFFAN. Common vocabulary approaches for government scientific and technical information systems. [Silver Spring, Md.], Datatrol Corporation, 1963. 108 p. tables, diagrs. (Technical Report IR-10.)

HAMMOND, WILLIAM, *and* ROSENBORG, STAFFAN. Experimental study of convertibility between large technical indexing vocabularies . . . [Silver Spring, Md.], Datatrol Corporation, 1962, var. paging. tables, diagrs. (Technical Report, IR-1.)

HENDERSON, MADELINE M., *and others*. Cooperation, convertibility, and compatibility among information systems: a literature review. Washington, National Bureau of Standards, 1966. iii, 140 p. (N.B.S. Misc. Publ. 276).

HERNER, SAUL, *and others*. A use evaluation of the AIChE bibliographic descriptions and the chemical engineering thesaurus. Washington, Herner & Co., 1964. 60 p.

HOLM, B. E., *and* RASMUSSEN, L. E. Development of a technical thesaurus. *American Documentation,* vol. 12, no. 3, July 1961, p. 184–90.

HOLM, B. E. Engineering information retrieval. Copied from *Chemical Engineer,* December 1964, p. CE 291–2, 299.

HOLM, B. E. Information retrieval—the problem . . . coordinate indexing—a solution. [Rev. ed.] New York, Engineers Joint Council, 1964. 27 p. illus., diagrs.

HOLST, W. Problems connected with the use of a polytechnical thesaurus. *Bulletin de l'A.I.D.,* vol. 5, no. 4, 1966, p. 105–9.

HYSLOP, MARJORIE R. Joint development of a common information system by two organizations working in different disciplines. *Bulletin de l'A.I.D.,* vol. 5, no. 4, 1966, p. 89–97.

HYSLOP, MARJORIE R. Sharing vocabulary control. *Special Libraries,* vol. 56, no. 10, December, 1965, p. 708–14.

JASTER, JOSEPHINE J., *and others*. The state of the art of coordinate indexing . . . Prelim ed. Washington, Documentation Incorporated, 1962 [3], 256 p.

JOYCE, T., *and* NEEDHAM, R. H. The thesaurus approach to information retrieval. *American Documentation,* vol. 9, no. 3, July 1958, p. 192–7.

KLINGBIEL, PAUL H. The DDC Thesaurus: past, present and future. *Aslib Proceedings,* vol. 16, no. 8, August 1964, p. 252–7.

LANCASTER, F. W. Some observations on the performance of EJC role indicators in a mechanized retrieval system. *Special Libraries,* vol. 55, no. 10, December 1964, p. 696–701.

LONDON, GERTRUDE. A classed thesaurus as an aid to indexing, classifying and searching: report for the period, July 1965–July 1966. New Brunswick, N.J., Rutgers, The State University, Graduate School of Library Service, October 1966. iv, 53, [37] p. tables.

LONDON, GERTRUDE. A classed thesaurus as an intermediary between textual, indexing and searching languages. *Revue Internationale de la Documentation,* vol. 32, no. 4, November 1965, p. 145–9.

LUHN, H. P. A new method of recording and searching information. *American Documentation,* vol. 4, no. 1, Winter, 1953, pp. 14–6.

LUHN, H. P. Potentialities of auto-encoding of scientific literature. New York, IBM, 1959. 22 p.

MASTERMAN, MARGARET. The potentialities of a mechanical thesaurus. Cambridge, Language Research Unit, 1956, 17 p.

MODEL, FR. Thesaurus in der Dokumentation—Vielschichtigkeit des Begriffes und historische Entwicklung. [The thesaurus in documentation—multiple aspects of the concept and its historical development.] *Nachrichten für Dokumentation,* vol. 17, no. 1/2, March 1966, p. 5–11.

MOSS, R. Vocabularies for Batten card ('Peek-a-Boo') indexing. Paper from proceedings of Aslib 38th annual conference, University of Exeter, 1964, p. 2–55—2–62.

NEWMAN, SIMON M. *ed.* Information systems compatibility. New York, Spartan; London, Macmillan, 1965. vi, 150 p. tables, diagrs. (The American University Technology of Management Series, vol. 1, gen. ed. Paul W. Howerton.) p. 47–84.

NICOLAUS, JOHN J. Description of the Bureau of Ships thesaurus of descriptive terms and code book. *Bulletin de l'A.I.D.,* vol. 5, no. 4, 1966, p. 59–65.

NOBBS, P. M. Pulp and Paper Research Institute of Canda [thesaurus]. *Bulletin de l'A.I.D.,* vol. 5, no. 4, 1966, p. 79–80.

OVCHINNIKOV, V. G. Tezaurus i nekotorye metody ego postroeniya, Ch. I. Tezaurus kek sistema klassifikatsii faktor. [The thesaurus and its method of construction. Part 1. The thesaurus as a system classification of data.] *Nauchno-Tekhnicheskaya Informatsiya,* no. 8, 1966, p. 24–8.

OVCHINNIKOV, V. G. Tezaurus i nekotorye metody ego postroeniya. Ch. II. Metody postroeniya tezaurusa. [The thesaurus and its method of construction. Part 2. Methods of construction.] *Nauchno-Tekhnicheskaya Informatsiya,* no. 9, 1966, p. 20–6.

PAPIER, LAWRENCE S., *and* LIN, THOMAS T. First letter frequency of related term references in four technical thesauri. Edgewood, Md., U.S. Army, 1965. 35 p. (U.S. Army, Edgewood Arsenal. Chemical Research and Development Laboratories. Special Publication 5–12).

PAPIER, L. S., *and* CORTELYOU, E. H. Use of a technical word association test in the preparation of a thesaurus. *Journal of Documentation,* vol. 18, no. 4, December 1962, p. 183–7.

REISNER, PHYLLIS. Evaluation of a "growing" thesaurus. New York, IBM Watson Research Center, 1966. 19 p. tables.

RIECK, J. Thesauri über die Entwicklungslander-Dokumentation. [Documentation thesauri in newly developing countries.] *Nachrichten für Dokumentation,* vol. 18, no. 1, February 1967, p. 32–4.

ROLLING, LOLL N. A computer-aided information service for nuclear science and technology. *Journal of Documentation,* vol. 22, no. 2, June 1966, p. 93–115.

ROLLING, LOLL N. The role of graphic display of concept relationships in indexing and retrieval vocabularies including a thesaurus of documentation terms. Brussels, Euratom, 1965. 22 [7] p. diagrs. (EUR 2291.c.) FB 50.

ROSENBAUM, HANS-DIETER. Technische Thesauri in Westeuropa. [Technical thesauri in Western Europe.] *ZIID-Zeitschrift,* vol. 13, no. 4, August 1966, p. 114–6.

SCHANCHE, GRETE. Erfaringer fra arbeidet med en polyteknick Tesaurus som indeksoringsgrunnleg. [Experience derived from work with a polytechnical thesaurus as an index basis.] *Tidskrift för Dokumentation,* vol. 22, no. 3, 1966, p. 38–40.

SCHEELE, MARTIN. Thesaurus—Baustein jeder Fachdokumentation. [Thesaurus —basis of all subject control.] *Nachrichten für Dokumentation,* vol. 15, no. 1, March 1964, p. 1–4. English translation held.

SCHIRMER, ROBERT F. Thesaurus analysis for updating. *Journal of Chemical Documentation,* vol. 7, no. 2, May 1967, p. 94–8.

SPEIGHT, FRANK Y. What is "The Thesaurus of engineering terms" developed by the Engineers Joint Council (EJC). *Bulletin de l'A.I.D.,* vol. 5, no. 4, 1966, p. 29–43.

STEVENS, MARY ELIZABETH. Automatic indexing: a state-of-the-art report. [Washington], National Bureau of Standards, 1965. v, 220 p. tables, diagrs. (National Bureau of Standards Monograph 91).

TAUBE, MORTIMER. Extensive relations as the necessary condition for the significance of "thesauri" for mechanised indexing. *Journal of Chemical Documentation,* vol. 3, no. 3, July 1963, p. 177–80.

TAUBE, MORTIMER, *and others.* Unit terms in coordinate indexing. *In* DOCUMENTATION INCORPORATED. Studies in coordinate indexing, vol. 1, by M. TAUBE *and others.* [Bethesda, Md.], 1953, p. 37–46.

THOMAS, RICHARD B., *and* GULL, C. D. The choice of terms for a Uniterm coordinate index of scientific and technical reports. *In* DOCUMENTATION INCORPORATED. Studies in coordinate indexing, vol. 1, by M. TAUBE *and others.* [Bethesda, Md.], 1953, p. 47–55.

ULLMANN, HANS C. Indexing techniques. Santa Monica, California, Systems Development Corporation, 1966. 17 p. (SP- 2317.)

UNITED STATES. Bureau of Ships. The automated approach to technical information retrieval; library application by John J. Nicolaus. Washington, the Bureau, 1964. ii, 41 p. diagrs. (NAVSHIPS 250-210-2.)

UNITED STATES. Defense Documentation Center. Defense Supply Agency. DDC descriptor frequencies. Alexandria, Va., the Center, 1966. 49 p. (AD 632 600.)

UNITED STATES. Office of Naval Research. Dod manual for building a technical thesaurus [by J. Heston Heald and others]. Washington, the Office, 1966. [21] p. (AD 633 279.)

VICKERY, B. C. Thesaurus—a new word in documentation. *Journal of Documentation,* vol. 16, no. 4, December 1960, p. 181-9.

VICKERY, B. C. Vocabularies for coordinate systems. *Aslib Proceedings*, vol. 15, no. 6, June 1963. p. 170-6.

WALL, EUGENE. Indexing control in the technical information center. *In* CONFERENCE ON TECHNICAL INFORMATION CENTER ADMINISTRATION, 1st, Drexel Institute of Technology, Pa., 15-17 June, 1964. TICA 1: (proceedings) . . . Macmillan, 1964, p. 72-103.

WALL, EUGENE. Information retrieval thesauri. New York, Engineers Joint Council, 1962. 17 [5] p. tables. (PB 628 183.)

WHALEY, FRED R., *and* FLANAGAN, CAROLYN M. The Engineering Index thesaurus. *Bulletin de l'A.I.D.,* vol. 5, no. 4, 1966, p. 45-52.

WORKSHIP ON WORKING SEMI-AUTOMATIC DOCUMENTATION SYSTEMS. Warrenton, Va., 2-5 May, 1965. Proceedings. Warrenton, Va., Airlie Foundation, 1965. iii, 106 p. tables, diagrs. (AD 620 360.)

THESAURI HELD IN THE ASLIB LIBRARY
(for reference only)

AMERICAN INSTITUTE OF CHEMICAL ENGINEERS. Chemical engineering thesaurus: a wordbook for use with the concept coordination system of information storage and retrieval. New York, the Institute, 1961. var. paging.

COPPER DEVELOPMENT ASSOCIATION. Thesaurus of terms on copper technology. 3rd ed. New York, the Association, 1966. 166, [21] p. tables, diagrs.

DEUTSCHE GESELLSCHAFT FÜR DOKUMENTATION. Half-leiter Thesaurus (Entwurf). [Semi-conductor thesaurus (draft)], von E. H. H. Hungermann. Frankfurt, the Society, 1964. 120 p. Suppl. to no. 10 Auswertungs und Ordnungsverfahren in der Patentdokumentation.

ENGINEERS JOINT COUNCIL. Thesaurus of engineering terms; a list of engineering terms and their relations for use in vocabulary control indexing and retrieving engineering information. New York, the Council, 1964. xii, 302, xiii-xvii p.

EURATOM. Center for Information and Documentation. Euratom-thesaurus: indexing terms used within Euratom's nuclear documentation system. Part 1. 2nd ed. Brussels, Euratom, 1966, x, 91 p. diagrs. (Eur 500.e).

INSTITUT FRANCAIS DE RECHERCHES FRUITIERES OUTRE-MER (I.F.A.C.). Thésaurus documentaire de l'Institut... Ensemble structure des concepts et notions utilisée dans les index de la revue FRUITS (Fruits d'outre mer); preface de Ph. Ariès. [Comprehensive structure of the concepts and ideas used in the indexes of FRUITS.] Paris, the Institute, 1966 215 p.

INSTITUTE OF TEXTILE TECHNOLOGY. Textile Information Center. Textile technology terms: an information retrieval thesaurus. Charlottesville, Va., the Institute, 1966, ix, 329 p.

I.B.M. DATA SYSTEMS DIVISION. Technical Information Center thesaurus. 2nd ed. Poughkeepsie, New York, the Division, 1964. var. paging. (TR 00.1197.)

INTERNATIONAL LABOR OFFICE. Central Library and Documentation Branch. List of descriptors, 2nd ed. (August 1966). Geneva, the Office, 1966. 171 p. (LD/NOTES/17). Formerly DOC/NOTES series.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY. Fibers and Polymers Division. Thesaurus of textile engineering terms: a list of textile engineering terms and their relationships to be used in indexing and retrieving textile information. Cambridge, Mass., the Institute, 1966. v, 206, 55.

PULP AND PAPER RESEARCH INSTITUTE OF CANADA. Thesaurus of pulp and paper terms: a list of keywords with their cross-relationships for use in indexing and retrieving information on pulp and paper technology, (edited and compiled by John E. Tasman, Peter M. Nobbs.) Pointe Claire, Quebec, the Institute, 1965. x, 97 p.

RESEARCH TRIANGLE INSTITUTE. Operations Research and Economic Division. Civil defense information systems analysis: a feasibility study of research information exchange, by W. T. Herzog (and) J. E. Jenkins. Durham, North Carolina, the Institute, 1965. 2 v. tables, diagrs. (R-OU-158-1). Vol. I: (Text), Vol. II: A Thesaurus of civil defense descriptors appendix E. Prepared for U.S. Department of the Army. Office of Civil Defense.

ROLLING, L. A thesaurus of documentation terms, Brussels, Euratom, 1965. 22,[7] p. diagrs. (Eur 2291.e.)

SCHULTZ, CLAIRE K. Guide to current terminology in biomedical research. Reprint from *Federation Proceedings,* vol. 24, no. 4, July-August 1965, p. 96c–91.

SCHULTZ, CLAIRE K. Information science thesaurus. (Working paper.) Philadelphia, Pa., Drexel Institute of Technology. 1964. vi, 120 p.

UNITED STATES. Bureau of Reclamation. Thesaurus of descriptors: a list of keywords and cross-references of indexing and retrieving the literature of water resources development. Tentative ed. Denver, Colorado, the Bureau, October 1963, 3rd printing 1965. iii, 140 p.

UNITED STATES. Bureau of Ships. Technical Library. Thesaurus of descriptive terms and code book, 2nd ed. Washington, the Bureau, March 1965. xiii, var. paging. (NAVSHIPS 0900-002-0000.)

UNITED STATES. Federal Aviation Agency. Information Retrieval Branch. Thesaurus of FAA descriptors. 2nd ed. Washington, D.C., the Agency, November 1965. xxii, 232 p.

UNITED STATES. Armed Services Technical Information Agency. Thesaurus of ASTIA descriptors. 2nd ed. Arlington, Va., 1962. var. paging. Suppls.

UNITED STATES. Armed Services Technical Information Agency. ASTIA chemical thesaurus . . ., prepared by Julius From [and others]. Arlington, Va., 1962. 34 p. Supplement to 'Thesaurus of ASTIA Descriptors'.

UNITED STATES. Department of Health. Public Health Service. Medical and health related sciences thesaurus. Washington, the Service, 1963. viii, 213 p. (Public Health Service Publn. no. 1031.)

Letter to the Editor

USE OF BIOLOGICAL LITERATURE

Dear Sir,

In Dr Wyatt's absence I write to answer Miss Pile's letter in which she 'reviews' parts of a chapter in our recent book and our paper in the April *Aslib Proceedings*. It is self-evident that a user can only have direct and immediate access to those documents actually in the library in which he is working and must ask the library staff to obtain those other documents which he requires from elsewhere. With regard to *J. Exp. Med.* I would not expect this to be found often outside of places where it is read regularly—namely medical faculty libraries and perhaps certain pharmaceutical companies. Indeed, because of the pressure on library finances, few efficient librarians can afford the luxury of many journals which do not have a regular (albeit small) readership. The impression which I got from rereading Dr Wyatt's 'Epilogue' was not one of a moan about 'unhelpful and hidebound library services' but rather that library services are there to help the user obtain his literature requirements and in the main perform this task well despite the limitations imposed by shortages of money and adequately trained staff. Interpretation, like beauty, is in the eye of the beholder!

Delays and frustrations will inevitably occur. (I seem to remember not yet having received the *Chinese Journal of General Physiology*, 1937, or some such reference which I ordered from an industrial library in 1955.) Apart from allowing the librarian to make staff time available for processing borrowing requests to the NLL, etc., I cannot see how the user can help the librarian by giving him notice that a large-scale search is about to be undertaken. The documents required will not be known until the search is under way. Even if the user suspects that some of these may be papers in *J. Exp. Med.* he will not expect the librarian to borrow a whole run of this journal for the duration of his search. Of more direct value is the education of the user along the lines suggested in our recent paper in *Aslib Proceedings* and of the librarian/information officer. We have found that much valuable understanding of each other's problems occurs when they meet together socially over meals and coffee breaks whilst attending courses such as those organized annually at Bradford and Liverpool on the use of biological literature and chemical literature.

Yours faithfully,

R. T. BOTTLE

School of Chemistry,
University of Bradford,
Bradford 7.
3rd August 1967.

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Books and Pamphlets

AMERICAN FEDERATION OF INFORMATION PROCESSING SOCIETIES
Proceedings of the Fall Joint Computer Conference 1965, vol. 27, part 2. Computers: their impact on society. London, Academic Press, 1967. xi, i, 181 p. tables, diagrs.

AMERICAN MATHEMATICAL SOCIETY
Development of computer aids for tape-control of photocomposing machines: mechanization of Mathematical Reviews office procedures. Providence, R.I., the Society, 1967. 20, var. paging. diagrs.

AUSTRALIA. Commonwealth Government Printing Office
Style manual for authors and printers of Australian government publications. Canberra, the Office, 1967. xiv, 265 p. illus. $4.00.

BRITISH STANDARDS INSTITUTION
Specification for conventional typographical character for legibility tests. (ISO test character.) Metric Units. London, B.S.I., 1967. 8 p. diagr. (B.S. 4189 : 1967.)

BRITISH STANDARDS INSTITUTION
Specifications for microfiches. Metric Units. London, B.S.I., 1967. 13 p. diagr. (B.S. 4187 : 1967.)

CUNNINGHAM, EILEEN R.
Classification for medical literature. 5th ed. Nashville, Tennessee, Vanderbilt University Press, 1967. xix, 267 p. $6.00.

*GERMANY. Federal Republic. *Zentralstelle für maschinelle Dokumentation*
Maschinelle Dokumentation in der Bundesrepublik Deutschland. [Mechanized documentation system in the Federal Republic of Germany.] Frankfurt-am-Main, the Centre, 1967. 20 p. (ZMD–A–13.)

ILLINOIS. UNIVERSITY. *Graduate School of Library Science*
Proceedings of the 1966 Clinic on library applications of data processing. Champaign, Ill., Illini Union Bookstore, 1967. vi, 218 p. illus., diagrs. $3.00.

INTERNATIONAL CONGRESS ON CONGRESS ORGANIZATION, (4th), Copenhagen, 1966
Proceedings . . . Brussels, Union of International Associations, 1967. 84 p. photos, tables, diagr. 21*s*.

JONES, KAREN SPARCK, *and* JACKSON, DAVID M.
The use of the theory of clumps for information retrieval: report on the O.S.T.I.-supported project at the C.L.R.U. Cambridge, Cambridge Language Research Unit, 1967. 51, [14] p. tables, diagr.

KOZLOW, R. D.
Report on a library automation project, conducted on the Chicago Campus. Chicago, University of Illinois, 1966. iii, var. paging.

LEHIGH UNIVERSITY. Center for the Information Sciences
Systems manual for the experimental literature collection of the Center for the Information Sciences. Bethlehem, Pa., the Center, 1967. 44 p. tables, diagrs.

LEIMKUHLER, FERDINAND F.
The distribution of references in serials. Lafayette, Ind., Purdue University, 1966. 14 p.

LEIMKUHLER, FERDINAND F.
A literature search model. Lafayette, Ind., Purdue University, 1967. [16] p. diagrs. (PB 174 390.)

LENDVAYOVA, OLGA
Czechoslovak bio-medical serials: their identification and an analysis of their contents. Washington D.C., George Washington University, Biological Sciences Communication Project, 1967. iii, 68 p.

*LIBRARY ASSOCIATION. Northern Ireland Branch
Directory of Northern Ireland libraries. Belfast, the Branch, 1967. 22 p. 5*s*.

LINDERMAN, WINIFRED B., *ed.*
Present status and future developments of reference/information service: proceedings of the conference held at the School of Library Service, Columbia University, March 30–April 1, 1966. Chicago, American Library Association, 1967. x, 195 p. $3.75.

LINE, MAURICE B.
Library surveys: an introduction to their use, planning, procedure and presentation. London, Bingley, 1967. 146 p. tables, diagr. 30*s*.

LOOSJES, TH. P.
On documentation of scientific literature, translated by A. J. Dickson. London, Butterworth, 1967. ix, 165 p. tables, diagr. 42*s*.

MOREHOUSE, H. G.
Telefacsimile services between libraries with the Xerox Magnavox Telecopier, a study prepared for the Council on Library Resources, Inc. Reno, Nevada, University Library, 1966. 54 p. tables, diagrs.

*NEWBY, FRANK
How to find out about patents. Oxford, Pergamon Press, 1967. xi, 177 p. illus., diagrs. (Commonwealth and International Library of Science, Technology, Engineering and Liberal Studies. Libraries and technical information division. Gen. ed. G. Chandler.) 30*s*.

PAISLEY, WILLIAM J., *and* PARKER, EDWIN B.
Scientific information exchange at an interdisciplinary behavioral science convention. Stanford, Calif., University, Institute for Communication Research, 1967. iii, 46, var. paging.

PATAKY, E., *and* BERECZKY, L.
Methodological services for learned and special libraries in Hungary. Budapest, Working Committee of Methodology for Learned Libraries and the Centre for Library Science and Methodology, 1967. 40 p. tables.

PETRU, WILLIAM C.
The library: an introduction for library assistants, a project of the San Francisco Bay Region Chapter. New York, Special Libraries Association, 1967. 88 p. tables, diagrs. $4.00.

SARACEVIC, TEFKO
Linking research and teaching: description of a laboratory course resulting from a research project at a library school. Cleveland, Ohio, Western Reserve University, Centre for Documentation and Communication Research, 1967. 27 p. tables. (CSL: TR-10.)

SARACEVIC, TEFKO, *and* ROTHENBERG, LESLIE
Procedure manuals for the comparative systems laboratory experiments. Cleveland, Ohio, Western Reserve University Centre for Documentation and Communication Research, 1967. 199 p. tables. (CSL: TR-8.)

*SMITH, D. L.
How to find out in architecture and building: a guide to sources of information. London, Pergamon, 1967. xiii, 232 p. illus., diagr. 21*s*.

SMITH, JOSEPH BORDEN
Management information support of technical managers in small industrial research firms. (Microfilm.) $6.95.

SPECIAL LIBRARIES ASSOCIATION
A study of 1967 annual salaries of members of Special Libraries Association. New York, S.L.A., 1967. 40 p. tables.

SPEECKAERT, G. P.
The various types of international meetings, arrangement of rooms, equipment and services. Brussels, Union of International Associations, 1967. 75 p. photos, tables, diagr. 21*s*.

SPEIGHT, FRANK Y., *ed.*
Guide for source indexing and abstracting of the engineering literature. New York, Engineers Joint Council, 1967. 21 p. diagrs.

*SVENSK biblioteksmatrikel, 1966
Lund, Sweden, Bibliotekstjänst, 1965. 318 p. 55 S.Kr.

SYSTEMS DEVELOPMENT CORPORATION
A system study of abstracting and indexing in the United States. Falls Church, Va., the Corporation, 1966. ix, 228 p. tables, diagrs. (PB 174 249.)

TAYWARD, W. BOYD, *and* SVENONIUS, ELAINE
Studies of indexing depth and retrieval effectiveness: consistency, consensus sets and random deletion. Chicago, University of Chicago, Graduate Library School, 1967. 12 p. diagrs. (Progress Report no. 2.)

WILLIAMS, B. J. S.
Evaluation of microrecording techniques for information and data storage and retrieval. Hatfield, Hertis, 1967. vi, 104 p. tables, diagr.

ZULL, CAROLYN G., *and* BAUMANIS, GEORGE J.
Textual correlates of relevance: preliminary investigations. Cleveland, Ohio, Western Reserve University, Centre for Documentation and Communication Research, 1967. 43 p. tables, diagr. (CSL: TR-9.)

Articles and Papers

ADKINSON, B. W.
The organization of information—how it is done in the U.S.A. Copied from *Advancement of Science*, vol.23, no.118, April 1967, p.619-24.

ATKINSON, FRANK
By due steps: programmed learning techniques and the librarian. *Library Association Record*, vol.69, no.7, July 1967, p.259-42.

BAUER, GERD
Anwendung des Prinzips der Facettenklassifikation für den Aufbau von Thesauri. [Use of the faceted classification principle for compiling thesauri.] *ZIID-Zeitschrift*, vol.14, no.3, June 1967, p.72-83.

BENGE, R. C.
Library education in Ghana, 1961–67. *Library Association Record*, vol.69, no.7, July 1967, p.225–9.

BOURNE, H. K.
The work of the United Kingdom Scientific Mission. *The Information Scientist*, vol.1, no.1, July 1967, p.3–14.

BRADLEY, ALBERT P.
The NASA Manned Spacecraft Center Library—practical mechanization of library functions on a daily basis. *Special Libraries*, vol.57, no.10, December 1966, p.692–7.

CAWKELL, A. E.
Simplified information theory and data transmission. Copied from *Electronic Engineering*, vol.39, no.470, April 1967, p.212–18, *and* vol.39, no.471, May 1967, p.302–9.

CAYLESS, C. F.
Progress in automated librarianship. *New Scientist*, vol.35, no.555, 27th July 1967, p.188–9.

CHASEN, LAWRENCE I.
Information retrieval systems and technology in an aerospace library. *Special Libraries*, vol.57, no.10, December 1966, p.687–91. Development of a random access information retrieval system and automation of many clerical routines.

COCKX, A.
Het NCWTD: effectief antwoord op informatie-probleem. [The NCWTD: an effective reply to information problems.] *Tijdschrift voor Efficiëntie en Documentatie*, vol.37, no.8, August 1967, p.571–3.

COX, NIGEL S. N., *and* GROSE, MICHAEL N.
Computers in the library. *New Scientist*, vol.35, no.554, 20th July 1967, p.137–8.

CURRAS, EMILIA
La documentación y la información, temas de actualidad. Extracted from *Quimica e Industria*, vol.13, November–December 1966, p.195–8.

FAREWELL to D.C. 17: British National Bibliography may reject the new edition of Dewey. *Catalogue and Index*, no.7, July 1967, p.1, 12.

FIRSOV, G. G.
Centralized cataloguing and its importance. *Unesco Bulletin for Libraries*, vol.11, no.4, July–August 1967, p.200–6.

FOX, THEODORE
Crisis in communication: the functions and future of medical journals. Copied from *American Journal of Orthopsychiatry*, vol.37, no.3, April 1967, p.507–20.

GARFIELD, EUGENE
Primordial concepts, citation indexing, and historio-bibliography. *Journal of Library History*, vol.2, no.3, July 1967, p.235–49.

GOLDWYN, A. J., *and* EMBER, G.
DIAPAS: a "personalized alerting service" for diabetes. *Methods of Information in Medicine*, vol.6, no.3, July 1967, p.130–5.

GORDON, L. L.
The work of the Economist Intelligence Unit. *The Information Scientist*, vol.1, no.1, July 1967, p.35–43.

GRIFFIN, HILLIS L.
Computer programming for library applications. Copied from *Southeastern Librarian*, vol.15, no.3, Fall 1965, p.130–6.

HANDOVER, R. A.
Valuation of libraries [insurance]. *Unesco Bulletin for Libraries*, vol.11, no.4, July–August 1967, p.170–6.

HARRIS, W. P. G.
Communication: a classification for general libraries. *Library Association Record*, vol.69, no.7, July 1967, p.236–8.

HEINZE, HELMUT
Wege zur mathematischen Erfassung von Dokumentationsvorgängen. [A mathematical description of documentation processes.] *Nachrichten für Dokumentation*, vol.18, no.3/4, July 1967, p.100–3.

HEINZMANN, GUSTAV
Analyse von Dokumenten auf systemtheoretischer Grundlage. [Analysis of documents on the basis of system theory.] *Nachrichten für Dokumentation*, vol.18, no.3/4, July 1967, p.91–9.

HEWARD, F. C.
Information indexing by computer. Copied from *Post Office Electrical Journal*, vol.60, part 1, April 1967, p.28–32.

HEWITT, ROY
Case studies and their place in education for librarianship. *Library World*, vol.69, no.805, July 1967, p.8–10.

HILL, M. W.
The National Reference Library of Science and Invention. Copied from *Chemistry in Britain*, vol.3, no.6, June 1967, p.260.

KNIGHT, G. NORMAN
The indexers. *Catalogue & Index*, no.7, July 1967, p.8–10.

KOBLITZ, JOSEF. Hochschulausbildung im Bereich der gesellschaftswissenschaftlichen Information und Dokumentation. [University education in the field of information and documentation for social sciences.] *ZIID-Zeitschrift*, vol.14, no.1, February 1967, p.2–6.

LANGHANS, SIEGFRIED
Zur Diskussion über die Ausbildung von Informations-fachkräften. [The education of information scientists.] *ZIID-Zeitschrift*, vol. 14, no.3, June 1967, p.68–71.

LARSEN, KNUD
Unesco course in librarianship. *Unesco Bulletin for Libraries*, vol.11, no.4, July–August 1967, p.177–81.

MALTHA, D. J.
Opleiding voor informatiewerk. [Training for information executives.] *Tijdschrift voor Efficiëntie en Documentatie*, vol.37, no.8, August 1967, p.574–7.

MALTHA, D. J.
Van confectie tot mastwerk: attendering. [A spotlight on the development from overall information programmes to selective purpose information programming.] *Tijdschrift voor Efficiëntie en Documentatie*, vol.37, no.8, August 1967, p.568–71.

METCALFE, J. W.
Logical filing: a note on alphabetical arrangement. *Catalogue & Index*, no.7, July 1967, p.5, 7.

MITCHELL, EWAN
When you can copy within the law. *Office Equipment News*, July 15th, 1967. p.8–9.

PELTZ, MARGARETA
Aspecte ale mecanizarii si automatizarii informarii stiintifice si tehnice. [Aspects of mechanization and automation in technical and scientific information.] *Probleme de Documentare si Informare*, vol.1, no.5, May 1967, p.291–300.

PODELL, HAROLD J.
Instant television filing and retrieval. Copied from *Systems*, vol.6, no.4, May 1965, p.20–1, 54, 56.

RECRUITMENT and library education: special issue. *Illinois Libraries*, vol.49, no.5, May 1967.

ROLLING, LOLL N.
Die literatur der Kerntechnik. [The literature of nuclear technology.] *Nachrichten für Dokumentation*, vol.18, no.3/4, July 1967, p.117–23.

ROLOFF, HEINRICH
Nationales Symposium—Thesauri. *Zentralblatt für Bibliothekswesen*, vol.81, no.7, July 1967, p.398–401.

ROSENBERG, VICTOR
Factors affecting the preferences of industrial personnel for information gathering methods. *Information Storage and Retrieval*, vol.3, no.3, July 1967, p.119–27.

ROTH, HAROLD L., *et al.*
Education for special librarianship. *Journal of Education for Librarianship*, vol.7, no.1, Summer 1967, p.3–20.

SCHULZ, KARL
Zum Problem der Ermittlung des ökonomischen Nutzeffektes der Informationstätigkeit. [On the problem of finding out the economic efficiency of information work.] *ZIID-Zeitschrift*, vol.14, no.3, June 1967, p.88–90.

SEWELL, P. H.
The development of technical college libraries. *Library World*, vol.68, no.804, June 1967, p.331–3.

SOERGEL, DAGOBERT
Mathematical analysis of documentation systems: an attempt to a theory of classification and search request formulation. *Information Storage and Retrieval*, vol.3, no.3, July 1967, p.129–73.

SVIRIDOV, F. A.
Role and activities of the International Federation for Documentation. *Unesco Bulletin for Libraries*, vol.11, no.4, July–August 1967, p.196–9, 206.

SWANSON, DON R.
University of Chicago Graduate Library School. *Illinois Libraries*, vol.49, no.5, May 1967, p.408–12.

TAGLIACOZZO, R.
Citations and citation indexes: a review. *Methods of Information in Medicine*, vol.6, no.3, July 1967, p.136–42.

TAIT, JAMES A.
The Anglo-American cataloging rules, 1967. *Library Review*, vol.21, no.2, Summer 1967, p.69–74.

VICKERS, P. H.
Tape-typewriters: practical aspects of their use in information work. *The Information Scientist*, vol.1, no.1, July 1967, p.17–34.

[WESTERN RESERVE UNIVERSITY. School of Library Science.]
Center for Documentation and Communication Research. *T.A. Informations*, no.1, 1967, p.21–6.

WOOSTER, HAROLD
Books and libraries in the scientific age. *Library Journal*, vol.92, no.13, July 1967, p.2511–5.

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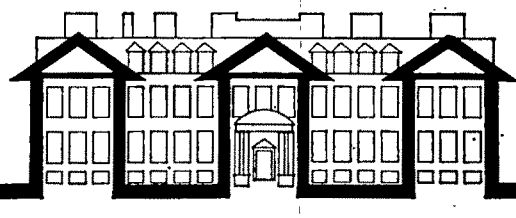

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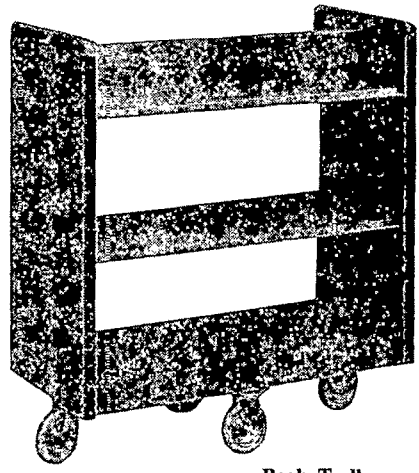

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incorporating Aslib Information

Patent Information Services

V. TARNOFSKY

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ASLIB PROCEEDINGS

incorporating Aslib Information

Volume 19 October 1967 Number 10

ASLIB CALENDAR 1967

October

WED.25.	Scottish Branch meeting. University of Strathclyde, Glasgow, 7 p.m. 'The provision of a library/information service for/by newspapers,' by Miss A. S. Brown.
THU.26.	Evening meeting 5 for 5.30 p.m. Royal Aeronautical Society. 'Trade unions and information facilities,' by Victor Feather, Assistant Secretary, T.U.C.

November

THU.2.	Transport Group one-day conference on transport statistics at the Society of Motor Manufacturers and Traders Ltd.
WED.8.	Joint evening meeting with BSI Standards Associates' Section. 'Standards information—what you need and where to get it,' by R. L. Collison.
TUE.21. – FRI.24.	Course on Business Archives.
WED.22.	Evening meeting. 'United Kingdom input to *Nuclear Science Abstracts*,' by J. E. Terry, AERE.
THU.23.	Technical Translation Group, 5 p.m. 'Technical interpreting as an interesting sideline.'
WED.29.	Chemical Group one-day meeting on case studies of computers applied to information work. See paragraph below.
THU.30.	Mechanization Study Group open meeting, Aslib, 2.30 p.m. 'Direct access storage devices and their application in information retrieval,' by G. B. Searl (IBM).

December

WED.6.	Evening meeting. '*The Guinness Book of Records:* compilation of a reference book.'
WED.13.	Scottish Branch meeting at Royal Society of Edinburgh. 6.15 p.m.
WED.20.	Aslib Christmas Party.

1968

January

FRI.5.	Engineering Group. One-day conference on bio-medical engineering.
TUE.9.	Chemical Group meeting: 'How good is the Kent Service?', by Dr A. Kent.
TUE.23.	Evening meeting. 'The proposed World Institute for Documentation of Housing, Building and Planning.'

March

FRI.29.	Scottish Branch—Annual General Meeting and one-day conference.

Course on Co-ordinate Indexing

A new course on co-ordinate indexing will be held at Aslib Headquarters from Monday 8th to Friday 12th January 1968. This course has been prepared in collaboration with the Aslib Co-ordinate Indexing Group. It will cover not only the theoretical aspects of co-ordinate indexing, but also the various physical forms a co-ordinate index can take, and the strategies of construction and use. Lectures will be given by Mr J. L. Jolley, of J. L. Jolley & Partners Ltd, Mr R. M. McClelland, of King's College Hospital, and Mr Harry East, of the Aslib Research Department. There will also be an extensive programme of supervised practical work, and some visits to see systems in operation. A programme with application form is included in this issue. The fee for the course will be 30 gns. Students should either possess a degree or some professional qualification, or else have considerable experience of either library or information work or a scientific or technical subject. Numbers on the course will be strictly limited, so applications should be made early, on the form provided, to the Education Officer. Any prospective student who has not an academic or professional qualification should contact the Education Officer before sending in the form to explain the grounds on which he or she hopes to be accepted. Provisional booking will be accepted by telephone or telex.

Chemical Group

Mr L. W. Chubb. It is with deep regret that members will learn of the death of Mr Chubb on 25th August after a short illness. Mr Chubb's course 'Basic Chemistry for Non-Chemists' was originally for 'Shell' staff, but was later presented in a modified form for members of the Chemical Group in October 1966. Every time the course was announced it was heavily overbooked; inquiries were received from as far away as Australia and it attracted the interest of documentation centres in other countries. Mr Chubb's experiments with this type of teaching provided a valuable contribution to the training of documentalists and the guidelines he produced will doubtless be adopted elsewhere for similar courses.

Computer Software. Arising from the recommendations of the Group's Conference at Attingham Park last May, a one-day meeting will be held at Aslib on Wednesday 29th November. Four papers will be given dealing with case studies of computers applied to information work with particular emphasis on the practical results.

The full programme is:

10.00 G. W. Thomas and P. H. Scott (British Petroleum): Experience with a computer-based information system using the American Petroleum Institute's package.

11.00 Coffee.

11.30 P. Gallagher ('Shell' Woodstock Agricultural Research Centre): Storage and retrieval of chemical structures using the IUPAC notation.

12.30 Lunch (at the Goring Hotel).

2.30 Miss A. Haygarth Jackson (ICI Pharmaceuticals): Evaluation of Uniterm Index to US chemical patents using weighted term techniques.

3.30 Tea.

3.45 Dr M. A. Simkins (Smith Kline & French): Comparison of results from similar questions addressed to the CT, CBAC and ASCA tapes.
4.45 General discussion.

Dr Batten is expected to take the Chair. The conference fee is £2 2*s*, including lunch, wines, etc., and bookings should be made *immediately* to Mrs M. A. Ferrie (Minnesota Mining & Manufacturing Co, Wigmore Street, London W1), as there are only eighty places.

NRCd courses

The programme of short courses at the National Reprographic Centre for documentation this session includes one-day courses on the 21st November, 6th February and 26th March for personnel engaged in microfilm work in libraries; one-week full-time courses in November, February and April on document reproduction for office executives; one-week full-time courses on recent developments in reprographic technology, covering the silver halide process (9th-13th October), diazo and electrophotography (11th-15th March 1968), and thermographic, Kalvar, photochromic and photopolymer processes (13th-17th May 1968); and a course of ten lectures on Tuesday evenings at 6.30 beginning on the 3rd October, on reprographic techniques and systems application.

Further details of courses, fees, etc. may be obtained from the National Reprographic Centre for documentation, Hatfield College of Technology, Hatfield, Herts.

Use of biological literature

The fourth annual short course on the Use of Biological Literature will be held at the University of Bradford from Wednesday 8th to Friday 10th November. The course is intended for information officers and science librarians, but will also be useful to scientists. Lectures and seminars will be given by practising biologists and literature specialists, who will also direct the practical library work. The course will conclude with a visit to the National Lending Library for Science and Technology at Boston Spa.

Further details may be obtained from Dr H. V. Wyatt, University of Bradford, Bradford 7.

NRCd Technical Evaluation Report no. 1

The National Reprographic Centre for documentation has just issued its first *Technical Evaluation Report* (TER 67/1), a fifteen-page, A4-size pamphlet scrutinizing the UMI Model 100 microfilm reader. These reports are intended to provide users and manufacturers with detailed information on the performance of the latest equipment, and on the many points to be considered when selecting, designing or marketing reprographic equipment. The first report contains a detailed, illustrated description of the reader, its operation and routine maintenance, and the results of tests covering possible electrical hazards, loading and viewing roll film (35 and 16mm) and microfiche, folding and carrying, cleaning, maintenance, temperature, and legibility. Recommen-

dations are made for improvement. The report includes drawings and a full specification.

The price to non-subscribers is £5. Details of subscriptions and services may be obtained from the NRCd, Hatfield College of Technology, Hatfield Herts.

Industrial Training Symposium

The *Proceedings of the Industrial Training Symposium, November* 1966 are now available from the British Welding Research Association, Abington Hall, Abington, Cambridge, price 12*s* 6*d*. The symposium was organized by the Committee of Directors of Research Associations and held on the 16th November 1966.

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PATENT INFORMATION SERVICES

V. TARNOFSKY, B.A.

Senior Examiner, Classification Section, The Patent Office

Aslib Meeting, Thursday 22nd June 1967

THE object of this talk is to let you know what services are offered by the Patent Office to help people get at the technical information contained in patents. Since these services largely arise from the official work performed in the Patent Office, it would seem logical to say something about this work: this I also intend to do. Finally, I shall be giving some background detail on current activities in the Patent Office concerned with information storage and retrieval as well as some thoughts on one or two possibilities for the future. In this way I hope to up-date the last address made to Aslib by a Patent Office speaker.[1]

First, what is a patent? A patent is granted by the Crown, the patentee obtaining a monopoly for a limited time in exchange for a full public disclosure of his invention. By this disclosure, the invention is added to the pool of public knowledge and can be used by anyone when the monopoly expires. The least a patent does is prevent others using what has been invented without permission of the patentee.

The most important part of a patent application is the specification of the invention. This is examined in the Patent Office mainly to see (*a*) that it relates to an 'invention' as this term is defined by law (*b*) that it clearly describes the invention to those skilled in the particular art concerned (*c*) that its claims, which define the monopoly, are clear, and (*d*) that it claims a *new* invention.

To test novelty, search is made through British patent specifications less than fifty years old, of which there are about one million. One thousand searches are currently made every week by the Patent Office examining staff. In fact, 47,000 complete applications were filed last year (70 per cent originating abroad), this figure of 47,000 continuing the 5 per cent compound increase per annum in application rate (which indicates a doubling period of fifteen years!).

The Classification System and Official Search

Now in order to make a search, a classification or indexing system is obviously necessary. The system used in the Patent Office originated in 1888 and all later forms have grown out of this one (I have included a brief historical survey in the explanatory booklet on the classification system and its use in searching).[2] Being designed primarily for the official search requirement, it is very detailed and indeed is now composed of about 45,000 sub-divisions (or 'terms').

The last major revision of the system (in 1963) had the effect of introducing a more logical superstructure as well as definitions of the scopes of the basic classifying units of the system. There are now 405 of these basic units, called

Headings, which are grouped to form forty Divisions, which are in their turn grouped to form eight Sections. The Headings usually either denote distinct fields, e.g. boots and shoes, or are general, e.g. alloys, impinge on other fields and often take priority in indexing to the exclusion of other Headings. The Headings fall mostly within two groups so far as indexing practice is concerned. In the one group, only novel features of subject-matter are indexed, while in the other group the practice is co-ordinate indexing. Our approach is now almost exclusively co-ordinate, where this is feasible, although I must add that we have practised this type of indexing for a very considerable time.

Turning now to the usual way in which searches are made in the Patent Office, I would first say that the examiner (*a*) indexes every accepted specification, this index then being printed in the heading of the published specification, and (*b*) abridges every accepted specification, this abridgment then being published separately. For search purposes, the specification and abridgment are pasted on a large card on the top of which are affixed metal clips which represent index terms by their colour and position. Search is made by first looking for cards having the appropriate index as shown by their clips, then looking at the abridgments on such cards, and finally studying the specifications on such cards, if necessary. Since the store and retrieval means are combined, this system is tolerant to wide variations in the size of the response to any search. Thus, when the indexing schedule performs well, it is a simple matter to locate the resulting small number of specifications using the 'clips.' In other cases, the system functions basically as a store in which the material is exceptionally well displayed.

SERVICES AVAILABLE TO THE PUBLIC: I

Five major services to the public stem from the work I have described so far:

1. *Standing Order Service.* We undertake to supply copies of all specifications, as soon as they are published, which relate to any subject expressed in the classification system. Thus a subscriber may ask for all specifications indexed under one of the 45,000 terms of the classification, or under one of a number of such terms, or, for example, all those indexed in one of the 405 Headings. The only charge made is that for the specifications supplied: no charge is made for the selection service.

2. *Official Journal (Patents).* This is published every Wednesday and is unique among the journals of the world's major patent offices in listing newly filed applications, thus giving advance information. It also contains indexed lists of newly accepted specifications: these lists appear six weeks before publication of the specifications so that printed copies may be ordered beforehand.

3. *Classification System.* This is printed as the *Classification Key* and is on sale in twenty-five units, each of these units being one or a number of the forty Divisions. I would recommend a close study of this publication if you are ever in need of a classification scheme for your own purposes. A revised edition is produced about every sixteen months: the next edition will contain a new feature, this being details of the differences between it and the immediately preceding edition.

4. *Abridgments.* These are abstracts of the salient features of accepted specifi-

cations and are published and put on sale. We recently started a new service, the main point of which is that we now issue abridgments within one week of issue of the corresponding specifications. The abridgments are published in twenty-five groups corresponding to the units of the *Classification Key,* and thus each of these groups covers a major field of manufacture. They come out weekly, in pamphlet form, one pamphlet for each of the groups. About every eight months, when the Patent Office has accepted 25,000 specifications, we supply subscribers to the abridgment service with the appropriate parts of the *Classification Key,* subject-matter index, name index and printed covers so that bound indexed volumes of abridgments can be made up to serve later for retrospective searches. Any number of groups from one to the full number of twenty-five can be subscribed to.

5. *File-lists.* The index of every accepted specification back to 1911 is represented by forty-column punched-cards, one card for each index term applied to each specification. Since the average number of index terms per specification is six and since there are one million specifications, we have six million of these punched cards. The cards are stored in 45,000 packs, one pack for each of the terms of the classification system, so that a list (or 'file-list') of all specifications back to 1911 indexed under any particular term may be supplied on demand by tabulating the appropriate pack of cards.

Until a short time ago the file-lists we offered were always based on the *Classification Key* current at the time. Thus any re-classification had to be taken back fifty years and consequent changes reflected in the punched-cards. This requirement often necessitated delays in the implementation of new classification schemes and occasionally the virtually needless re-classification of older specifications. We therefore split the service and now offer two series of file-lists based on these forty-column punched-cards:

Series A lists cover all specifications in the range 1911 to No. 1,000,000 according to the *Classification Key* edition operative at the time of No. 1,000,000 (accepted in 1965).

Series B lists cover all specifications from No. 1,000,001 to date according to the current edition of the *Classification Key.*

Where the index term is the same for both editions of the *Classification Key* (the majority of cases, in fact) we supply a combined Series A and Series B list for the price of one list. Furthermore, much new classification is now represented by eighty-column punched-cards from which Series C, D and E lists are produced—see later.

Finally I would mention that a combination of file-list plus abridgments represents a particularly useful search tool. In other words, a rapid way of making a search is to (*a*) obtain the list for the index term required, and then (*b*) check the patent numbers on this against the corresponding abridgments.

Indexing System Design

I should now like to move on and discuss our current attitude to the design of indexing systems. Our basic objectives here are (*a*) as always, to make sure that we miss nothing in our searches which is relevant to the application being searched, and (*b*) to reduce (or eliminate) the irrelevant response to searches

and thereby save the time of the examiner in his job of deciding on novelty.

Although classification systems (i.e. of the conventional pigeon-hole type) are useful in some applications, it is of course necessary when constructing them to determine the pigeon-holes in advance or, put another way, to predict the nature of the searches to be performed. This drawback does not exist with the type of system we have adopted, the co-ordinate term system. Which is not to say that we use a thesaurus (as the word is normally understood) because this has some serious drawbacks: (*a*) control of indexing is difficult, as is achievement of consistency between the indexer and a subsequent searcher,[3] (*b*) semantic relationships can only be expressed by role indicators which are difficult to use because they are so generalised, and (*c*) the very large number of terms make it difficult to handle.

Our approach is in fact towards the production of term systems for distinct fields of subject-matter. Smaller numbers of terms are necessary for each field and this makes for ease of handling. The function of role indicators is realised by grouping the terms into categories (or aspects) specific to the field concerned which together make a complete description of the field. The result in fact is a number of short generic/specific chains. The function of links is realised by separate tallies for those cases in which there are separate disclosures in one specification.[4]

Most of our major schemes are now being developed in co-operation with other patent offices under the aegis of ICIREPAT (see below): one of the standing committees of that body has produced the following scheme for the development of new indexing systems which we now follow:

(*a*) the subject-matter field is chosen and fairly precisely defined. The field should, of course, be active in terms of the number of new applications being filed, and may either be large in the sense of the number of specifications to be searched through, or new and obviously destined to grow rapidly.

(*b*) a draft co-ordinate term list is produced which is tested against claims to be searched since the only terms required for search purposes are those corresponding to the subject-matter in claims. The test is performed on the claims of a sample of our arrear of applications to be examined. Among other things, it involves a comparison of the number of terms in the term list relevant to the claims, with the number of features in the claims not matchable by available terms. The term list is amended accordingly.[5]

(*c*) an indexing trial is held in which the same random sample of specifications are indexed by two or more examiners. This detects ambiguities and further deficiencies in the term list.

(*d*) a sample random file of a few hundred specifications is indexed and test searches made through this. The object here is to give a check on the depth of indexing which determines the size of the response to searches.

(*e*) the manual describing the system and containing a definition of the scope of the field, rules for indexing, advice on searching etc., is finalised and the complete collection of specifications is indexed ready for operational use.

Mechanized Search

Since these systems generally comprise several hundred terms, involve the logical intersection and logical sum of terms for search purposes, and are designed to yield a good (i.e. low) response, it is both necessary and feasible to divorce the retrieval means from the document store.

We therefore implement these systems by eighty-column punched-cards, generally one per specification. Bibliographic data is punched alphanumerically while the terms are direct-coded i.e. a single hole position in the card is dedicated to each term. The cards are searched in our mechanical search unit by means of an ICT 335 multi-column sorter which may be set up to look for a pattern of holes in logical relationships. Cards having the required pattern of holes actuate an on-line typewriter which prints out their bibliographic data (particularly patent number).

Searches may also be performed on a single-column sorter by repeated card passes with out-sorting.[6] Thus search is made first for cards having the rarest term required by the search formulation and such cards are out-sorted. The latter are then searched on the next rarest term required and cards having this are out-sorted. The operation is terminated when the cards are down to a conveniently small number or, of course, when the last term of the search has been run.

Over twenty of our Headings are now machine-searchable. We currently perform about fifty official searches per week by machine.

We tried using peek-a-boo (or feature) cards in a few Headings but abandoned the idea because:

(*a*) they were particularly tedious to punch, especially so with the high accuracy we require,

(*b*) they were not convenient for searches involving complex logical relationships,

(*c*) they necessitated a two-stage access to the store, a translation step being required from the peek-a-boo card grid number to the specification number, and

(*d*) they would have been awkward to use in providing a public service.

SERVICES AVAILABLE TO THE PUBLIC: 2

Further services to the public stem from the mechanical search activities I have described in the preceding section:

1. *File-lists.* We offer file-lists produced from the eighty-column cards in about twenty Headings. The Headings contributing to this service are identified in the file-list notice which appears once a month in the *Official Journal* (*Patents*). The lists mostly cover all specifications back to 1911 and are always in accordance with the current edition of the *Classification Key*. There are three series of this type of list, Series C being for single terms while Series D and E are for logical *combinations* of terms (Series D for combinations of up to ten terms, Series E for combinations of eleven to twenty-five terms). Thus, for example, we could supply a Series D or E list giving the serial numbers of all specifications

describing alloy steels containing any particular proportions of, say, chromium, nickel, aluminium and molybdenum.

2. *Punched-cards.* We have now decided to offer for sale packs of eighty-column punched-cards which exactly correspond to those used in the Patent Office for machine searches and production of Series C, D and E file-lists. The operation is being costed at the present time: a notice will be inserted in the *Official Journal (Patents)* when the service becomes available. We shall probably start with the pack for the field of 'alloys' which is currently composed of about 14,000 cards. In addition to the packs we will provide explanatory manuals and term-frequency charts, the latter being of value in performing searches by single-column sorter as described above. To keep the packs up-to-date, we will supply cards for newly accepted specifications at frequent intervals as well as correction cards if necessary.

3. *Manuals.* These are booklets each devoted to a particular Heading which is machine-searchable and for which we offer Series C, D and E file-lists. They are intended to be adjuncts to the *Classification Key* and contain full information on indexing and searching. We currently have three manuals on sale. [7,8,9]

International Affairs

Two international factors play some part in the information retrieval activities of the Patent Office, one being ICIREPAT and the other, the IPC.

ICIREPAT (the acronym stands for Committee for International Co-operation in Information Retrieval among Examining Patent Offices) was founded in 1961 and now has a membership of over twenty of the world's patent offices as well as a number of treaty organisations. Its principle objectives are the shared development and use of mechanized search systems, and in particular, the shared indexing of documents to be searched, each office thereby saving in costly indexing time. In this respect it is worth pointing out that for every invention in the world, over three patent applications are made on average, each in a different country: the world figures are approximately 200,000 inventions/year and 650,000 patent applications/year. The outcome of these multiple applications is the publication by the various patent offices of virtually identical specifications: for example, a given invention may be represented by a British patent specification, a US patent and a German patent. The last-mentioned objective of ICIREPAT, i.e. shared indexing, would result in the index of one of this family of three patents being utilised for the other two.

ICIREPAT is currently working on a plan which will see the completion and shared-use of systems for twenty-five subject-matter fields, these covering about 10 per cent of our searches. The British Patent Office is very active in all this, since it has its alloys system in shared-use while it is currently developing a number of other systems, the largest being for the fields of electrolysis, moulding, and taps and valves.

The organisation has annual meetings the proceedings of which are published.[10,11,12]

The *International Classification of Patents for Invention (IPC)* is a product of the Council of Europe. The first edition has been published and is generally

available:[13] a revised second edition is in course of preparation. Its approach is not basically along co-ordinate lines—instead it seeks to allot specifications to single classes on the basis of what is the crux of invention. Most of the major patent offices in the world print the relevant IPC symbols on their specifications in addition to their own classification. It is in particular this universality which makes the IPC of value to the public.

Future Possibilities

Finally, I should like to mention some future possibilities. We are currently considering ways of reducing the expense involved in storing and producing copies of specifications for the public—it may surprise you to know that we daily supply 3,400 such copies. Although the committee on this subject has not yet reported, it is probable that they will recommend the use of aperture cards i.e. eighty-column cards with a 35mm frame of micro-film mounted in a rectangular hole between columns 53 and 77. The frame will provide for eight 16mm images, each of a single page of a specification and $\frac{1}{20}$th the size of the original. About 80 per cent of the specifications will therefore go on one card, the remainder will require two or more cards. The images will probably be negative, i.e. white-on-black, since (*a*) they are easy to view in normal room lighting, and (*b*) it is possible to produce black-on-white hard copies from them by direct methods.

We envisage the possibilities of (*a*) using these aperture cards to produce hard copies by xerography for sale to the public (*b*) selling copies of the cards themselves, and (*c*) using them in examiners' search files, as the document store for our high-performance retrieval systems. The addition of abridgments to the cards is also being considered.

Although roll-film is a possibility it does not have the random-access capability of an aperture card system and will therefore probably not find a place in the scheme.

We could start to produce micro-form for current acceptances within twelve months of a decision being taken to go ahead: we would also work back to cover all specifications published in the last fifty years.

No talk on the subject of information retrieval is now entirely complete without referring to the computer. As a matter of fact, we are at present studying some of the clerical routines in the Patent Office with a view to automating them in order to reduce expense. Obviously, we could also perform searches by computer, e.g. using the eighty-column cards we now process on a much simpler machine. But would it either be economic or able to do something more useful with the punched-cards? The answer to both questions is in my opinion no. Clearly, the thing to concentrate on is the input which in the present context means indexing system design. I see a use for the computer in the future, probably on a time-shared basis (*a*) when we exceed the capacity of our present installation (*b*) to cope with indexing systems too complex for machines without memories, and (*c*) if and when semantic and other difficulties are overcome, in full-text searching.

REFERENCES

1 GHEURY DE BRAY, M. R. Patent Classification. *Aslib Proc.* vol. 10, no. 12, December 1958, p. 316–19.

2 *Searching British patent literature.* Patent Office, February 1967.

3 ARNOVICK, G., LILLES, J. A., ROSEN, A. M. *and* WOOD, J. S. Information Storage and Retrieval: Analysis of the State of the Art. *AFIPS Conference Proceedings,* vol. 25, 1964.

4 Guiding principles for non-conventional retrieval systems. *Information retrieval among examining patent offices: Proceedings of the 4th annual meeting of ICIREPAT,* Washington, 1964, p. 80–8.

5 SNOW, D. C. Development and monitoring of indexing systems: Evaluation of term lists by comparison with a sample of claims in new patent applications. *Information retrieval among examining patent offices: Proceedings of the 5th annual meeting of ICIREPAT,* London, 1965.

6 See, for example, HYAMS, M. *Foreign patents documentation.* J. Chem. Doc. vol. 6, no. 2, May 1966, p. 119–20.

7 *Alloys—manual for punched-card retrieval system.* Patent Office, August 1965.

8 *Manual for the punched-card retrieval system for coating processes.* Patent Office, June 1966.

9 *Laminates and layered products—manual for punched-card retrieval.* Patent Office, London; IIB, The Hague, June 1966.

10 *Information retrieval among examining patent offices: Proceedings of the 3rd annual meeting of ICIREPAT,* Vienna, 1963. H. Pfeffer (ed.).

11 *Information retrieval among examining patent offices: Proceedings of the 4th annual meeting of ICIREPAT,* Washington, 1964. H. Pfeffer (ed.).

12 *Information retrieval among examining patent offices: Proceedings of the 5th annual meeting of ICIREPAT,* London, 1965. H. Pfeffer (ed.).

13 *International classification of patents for invention.* Council of Europe, 1963–6. (In nine volumes, according to subject-matter.)

DISCUSSION

Mr H. E. L. Freytag (Shoe and Allied Trades Research Association) observed that although the Patent Office Classification System had a heading 'boots and shoes' (A3B), a considerable number of patents which not only had the word 'footwear' in the title but were exclusively or certainly primarily concerned with footwear production were not indexed under A3B. As examples, he cited Patent 1,075,256 'Mould assemblies for moulding footwear uppers with tongues' indexed only under heading B5A, Moulding plastic substances etc, and Patent 1,076,493 'Fastening inserting machines for use, for example, in conforming shoe uppers to the shapes of appropriate lasts' indexed only under heading B4C, Impelling-tools etc.

Mr Tarnofsky replied that Mr Freytag seemed to have been misled into believing that the titles of the Patent Office Classification Headings were absolutely definitive. In fact, they were meant to be very brief indications of the subject-matter covered, the actual scope of the headings being determined by the definitions which followed the heading titles in the Classification Key. These definitions took the form of a concise 'including' statement followed by references to subject-matter which although swept up in the first statement was in fact classified in other headings. So far as heading A3B was concerned, its definition actually referred subject-matter to, inter alia, headings B4C and B5A. The latter were instances of 'general' headings, which in this case took priority in indexing to the exclusion of the 'application' heading A3B. This was also, he was afraid, a case of Patent Office interest having priority over Mr Freytag's interest. The Patent Office found it essential to collect, say, all impelling-tools together in the same heading, notwithstanding their application, because the claims they were called on to search were usually for the apparatus irrespective of its particular application: repetition of index in the application heading would be of no practical value to their searches.

Mr D. Whale (Tube Investments) asked what purpose the International Patent Classification served. Mr Tarnofsky had spoken of the Patent Office indexing efforts to reduce the number of patents that needed to be consulted in a search, yet the IPC, which was a pigeon-hole (one place) system, did not aid this approach. Did any patent examiners or patent agents use the IPC in their work?

Mr Tarnofsky said that the IPC was designed, among other purposes, to help the public make searches by collecting all inventions concerned with any particular subject together in the one place. Furthermore, it was applied by many of the world's patent offices with the result that searches could be made using the same class symbols through the patents issued by those offices. The IPC had replaced, or was in the process of replacing, the domestic classification systems used in some patent offices abroad: it was therefore true to say that some patent examiners used it in their work. From inquiries with which he had personally dealt, he knew that some members of the public used it in this country.

Mr Goodearl (De la Rue/Formica) said that it was sometimes difficult to get from the word or phrase useful in say finding the shelf work for storing books and journals on the subject in the National Reference Library of Science and Invention (Holborn Division) to the appropriate heading and subdivision in the Patent Office *Classification Key*. He gave silk screen printing as an example.

Mr Tarnofsky explained that there were two ways of getting from a particular subject to the appropriate heading in the *Classification Key*. One was by looking it up in the alphabetical *Reference Index to the Classification Key*: the other was by using the logical superstructure of the classification system itself as set out in the preface to each unit of the *Classification Key*. Since silk screen printing was a particular form of printing, the latter was the word to look up in the Reference Index. This volume indicated that printing processes and apparatus were classified in heading B6C. Since the silk screen method was a particular way of printing by stencilling, the appropriate subdivisions in heading B6C (namely C66B, C66A14 and C66C) were to be found under the main subdivision 'stencils and stencilling apparatus'. Using the superstructure of the *Classification Key*, printing was classified first under Section B (performing operations), then under Division B6 (stationery, printing, writing, decorating), and finally under Heading B6C (printing processes etc). He added that in cases where a prospective searcher had difficulty in identifying the heading or subdivision under which he should conduct his search, the Patent Office Classification Section would advise him about this on receipt of a request in writing.

Dr D. J. Campbell (Pressed Steel Fisher) asked to be told where a list was published of the fields covered by the co-ordinate index systems.

Mr Tarnofsky replied that the twenty or so co-ordinate index headings in respect of which the Patent Office were currently offering a combination file-list service were identified in the file-list notice which appeared in the last issue of every month of the Official Journal (Patents). Other co-ordinate index headings were either identified in the *Classification Key* by some such statement as 'index is made under all appropriate subdivisions' or were in some cases self-evidently of the type. The Patent Office intended to annotate all the headings in the *Classification Key* to show the indexing method employed.

Mr D. C. Snow (Patent Office) described the work now going forward under the auspices of the Committee for International Co-operation in Information Retrieval among Examining Patent Offices (ICIREPAT) in the construction of deep indexing systems. A number of such systems had already been adapted for shared use by several patent offices and others were in the course of development. Offices using a shared system were expected to contribute to the system file by indexing patents originating in their own countries and possibly certain other patents also. In this way international files for some subject-matter fields and available to all co-operating offices were being and would be built up in an economic manner. This created the possibility of extending the information retrieval services of the UK Patent Office in these fields to documents other than UK patent specifications.

Mr A. R. Webb (Smith and Nephew Research) inquired about the classification of subject-matter in patents outside the primary examiner's field of interest, and about the possibility of printing citations made by the examiners on the published UK Patent specifications.

Mr Tarnofsky explained that standard Patent Office practice was to index everything described in a patent that was likely to be of interest to a future searcher, whether it was

strictly relevant to the invention claimed or not. Index was made in as many headings as necessary, having regard to the definitions and other classifying directions in the *Classification Key*. However, if the matter was well-known and already indexed in a heading, and was at the same time not closely related to the claims, it was not indexed.

The printing of citations on the published patent specifications was prevented by Section 79(2) of the present Patents Act.

Mr J. T. Roberts (Reckitt & Sons) thought that the entry on Form 8 (a record of the citations made by the examiners against any given patent application) was now commonly 'nil'. Did this indicate a reduction in the efficiency of searching or of the searching facilities?

Mr Tarnofsky replied that the question was based on a supposition of the questioner's. Mr Roberts had probably not made a numerical analysis of the situation and neither for that matter had he. If there was anything in the assertion, he could only suppose that the quality of applications was now higher than it used to be and that this perhaps indicated that applicants were conducting more, or better, preliminary searches before filing their applications.

Mr Webb inquired about the classification and cross-referencing practice for adhesives and organo-metallic compounds.

Mr Snow explained that in a classification that had to be comprehensive over the whole field of technology it was impracticable for the individual classes (headings) to be comprehensive for all matter pertaining to a particular material or substance e.g. an organo-metallic compound, product e.g. a boot or shoe, process or apparatus but that each heading defined primarily in terms of a material, product etc, had to be restricted to certain kinds of subject-matter relating to that material, product etc. Thus the heading C2J, Organo-metallic compounds was in general, concerned only with novel organo-metallic compounds and with processes of making such compounds, whether new or old and in particular was not concerned with the uses of organo-metallic compounds e.g. as polymerization catalysts or insecticides. Similarly the moulding of boots and shoes was handled not in the heading Boots and Shoes, but in the heading Moulding Plastic Substances where an index entry would be found for boots and shoes as a product of a moulding operation or apparatus. As regards adhesives this raised the question of the most appropriate method of classifying materials and the purpose served by the classification. In general adhesives were synthetic resins or synthetic resin compositions and it had been found not only in the UK Office but elsewhere, e.g. the US Office, that for patent office purposes such adhesives were best classified as synthetic resins, i.e. by chemical constitution rather than by function. As a consequence the old heading Adhesives contained only residual matter.

SELECTIONS FROM THE RECENT LITERATURE

ALL ITEMS listed may be borrowed from the Aslib Library, except those marked *, which may be consulted in the Library.

Books and Pamphlets

BROUDIN, YVON
Le traitement de listes en programmation SLIP: langage de listes symmétrique—applications. Commissariat à l'Energie Atomique de France, June 1966. [var. pag.] (PB 170 935).

*BRUIN, J. H. I. DE
Microfiche services in libraries: an address list of libraries and other centres of literature information furnishing microfiche from their collections upon request. Delft, Microfiche Foundation, 1967. 19 p. (Publications on the microfiche, no. 7.)

CARROLL, JOHN M.
Syllabus for a course in file management. Bethlehem, Pa., Lehigh University, Center for the Information Sciences, 1967. 17 p. (Curriculum for the information sciences report no. 9.)

CHILDERS, THOMAS, *and others*
Book catalog and card catalog: a cost and service study. Towson, Md., Baltimore County Public Library, 1967. 45, [xvii] p. tables. $1.00.

*COVENTRY & DISTRICT INFORMATION GROUP
Directory of membership and resources, 1967. Coventry, CADIG, 1967. 40 p.

DONALD, A. G.
Management, information and systems. London, Pergamon, 1967. v, 169 p. tables, diagr. 21*s*.

DOYLE, LAUREN B.
Perpetual user studies: a prérequisite for management of information on a national scale. Santa Monica, Calif., System Development Corporation, 1966. 15 p.

*FEDERATION INTERNATIONALE DE DOCUMENTATION
Directories of science information sources: international bibliography. 2nd ed. The Hague, the Federation, April 1967. 163 p. (FID Publication no. 421.) 30G.

FOSTER, J. M.
List processing. London, Macdonald, 1967. 54 p. diagrs. 21*s*.

HAYS, D. G.
Introduction to computational linguistics. London, Macdonald, 1967. xvi, 231 p., tables, diagrs. 70*s*.

KEREN, CAREL
Information services in Holland, Denmark, Norway and UK: travel report. Tel-Aviv, Israel, National Council for Research and Development, Center of Scientific and Technological Information, 1967. 28 p.

KERSHAW, G. A., *and others*
Mechanised study of the Technical Information Reference Branch of the Systems Engineering Group, Wright-Patterson Air Force Base, Ohio. Bethesda, Md., Booz, Allen Applied Research Inc., September 1966. 26 p. illus., diagr. (AD 489 999).

RIDER, K. J.
The history of science and technology: a select bibliography for students. London, Library Association, 1967. 60 p. [Special Subject List no. 8.] 15*s*.

SAUNDERS, W. L., *ed.*
Librarianship in Britain today. London, Library Association, 1967. xviii, 173 p. 40*s*. (30*s*. members).

*SAUR, KLAUS GERHARD, *comp.*
Internationales Bibliotheksadressbuch—World guide to libraries, 1966. 2v. Munich, Verlag Dokumentation, 1966. DM 92,80.

*TSOUNIS, T., *comp.*
Scientific and technical documentation and information centres, research and development organisations: an international guide. Athens, Greek Productivity Centre, 1966. 491 p.

WALES. COLLEGE OF LIBRARIANSHIP. *Library Research and Information Department*
Education for librarianship: an outline list of materials. 2nd ed. Aberystwyth, the College, 1967. [40] p.

*WANDSWORTH PUBLIC, EDUCATIONAL & TECHNICAL LIBRARY SERVICES
Wandpetls directory. London, Wandpetls [1967]. 38 p.

Articles and Papers

ADKINSON, BURTON, W., *and* STEARNS, CHARLES M.
Libraries and machines—a review. *American Documentation,* vol.18, no.3, July 1967, p.121–4.

ASERLIND, LEROY
Library classification and retrieval in a special education instructional materials center. *Education Libraries Bulletin,* Summer 1967, p.12–23.

BATTY, C. D.
A documentation training model. *American Documentation,* vol.18, no.3, July 1967, p.125–30.

BRUCE, ROBERT K.
Legal problems facing libraries in developing countries. *IATUL Proceedings,* vol.2, no.3, August 1967, p.8–13.

CLASSIFICATION and indexing at the Office of Standard Reference Data. Reprinted from *NBS Technical News Bulletin,* vol.51, no.7, July 1967. 3p.

COLLEGE of Education libraries: recommended standards for improvement. *Library World,* vol.69, no.806, August 1967, p.46.

COOPER, MARIANNE, *and* COOPER, HENRY W.
Interpreting results of statistical studies. *College and Research Libraries,* vol.28, no.4, July 1967, p.266–8.

DAVIS, C. H.
SDI: a program for public libraries. *American Documentation,* vol.18, no.3, July 1967, p.139–45.

DEWS, J. DAVID
Computers and libraries. *Program,* no.6, July 1967, p.25–34.

DOUGHERTY, RICHARD M.
The realities of reclassification. *College and Research Libraries,* vol.28, no.4, July 1967, p.258–62.

DOVE, JACK
Librarians and their salaries. *Library World,* vol.69, no.806, August 1967, p.40–41.

ERIC: the United States Office of Education's educational research information center. *Education Libraries Bulletin,* Summer 1967, p.31–35.

EVANS, A. J., *and* WALL, R. A.
Library mechanisation projects at Loughborough University of Technology. *Program,* no.6, July 1967, p.1–4.

FOY, YVONNE, *comp.*
Periodicals held in the Aslib library as at 15th July, 1967. *Aslib Proceedings,* vol.19, no.8, August 1967, p.260–71.

FUKUDOME, TAKAO
The Japan Information Center of Science and Technology (JICST): its organisation and function. *American Documentation,* vol.18, no.3, July 1967, p.146–52.

GENNARO, RICHARD DE
A strategy for the conversion of research library catalog to machine readable form. *College and Research Libraries,* vol.28, no.4, July 1967, p.253–7.

GROENEWEGEN, H. W.
Automating the library. 1. A survey of the present progress. 2. A look into the future. Copied from *Data Trend,* February 1967, p.9–10, 12; March 1967, p.12, 14–15.

HAWKEN, WILLIAM R.
Microforms 1967 in libraries, archives and educational institutions. *Microfiche Foundation Newsletter,* no.15, August 1967, p.3–8.

KIMBER, R. T.
Computer applications in the fields of library housekeeping and information processing. *Program,* no.6, July 1967, p.5–25.

HILLS, J. P.
Technical writing for industry. *Technical Publications Journal,* vol.4, no.2, August 1967, p.65–79.

MARRON, H., *and* SNYDERMAN, M.
Cost distribution and analysis in computer storage and retrieval. II. *American Documentation,* vol.18, no.3, July 1967, p.162–4.

MENHENNET, DAVID, *and* POOLE, JOHN
Information services of the Commons library. *New Scientist,* vol.35, no.561, 7 September 1967, p.499–502.

MILLER, G. A.
Storage and retrieval of technical information in laboratories: generation of thesauri of technical terms. Copied from *Tappi,* vol.49, no.9, September 1966, p.79a–82a.

NEELAMEGHAN, A., *and others*
Motor vehicle production: depth classification—a demonstration. *Library Science with a Slant to Documentation,* vol.4, no.2, June 1967, p.97–178.

O,CONNOR, JOHN
Relevance disagreements and unclear request forms. *American Documentation,* vol.18, no.3, July 1967, p.165–77.

THE ORIGIN of punched paper tape. *Computer Weekly,* no.51, 7 September 1967, p.3.

PAZERA, E.
Setting up a feature card system. *O & M Bulletin,* vol.22, no.3, August 1967, p.149–62.

PRESTON, KEITH
Typesetting by computer. *Computer Weekly,* no.51, 7 September 1967, p.6.

REINTJES, J.
'Instant' librarians. Extracted from *The Christian Science Monitor,* 3 August 1967. 9p. Computers will add vast new dimensions to tomorrow's libraries.

SAHAI, S. N.
Documentation in social sciences. *Indian Librarian,* vol.22, no.1, June 1967, p.19–23.

SCHOLES, A. K.
Storage and retrieval of technical information. *South African Libraries,* vol.35, no.1, July 1967, p.19–25.

SOMERFIELD, G. A.
The next hundred weeks in chemical information. *Aslib Proceedings,* vol.19, no.8, August 1967, p.255–9.

TAPE punching equipment. Supplement to *Computer Weekly,* no.51, 7 September 1967, p.i-viii.

VERYHA, WASYL
Problems in classification of Slavic books with Library of Congress classification schedules. *College and Research Libraries,* vol.28, no.2, July 1967, p.277–83.

WELLMAN, D. D.
The theme system of indexing. Supplement to *O & M Bulletin,* vol.22, no.3, August 1967. 23p.

WIJN, J. H. DE
Classificatieproblemen in discussie. [A discussion on problems of classification.] *Tijdschrift voor Efficiëntie en Documentatie,* vol.37, no.9, September 1967, p.620–2.

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TECHNICAL SWEDISH, DANISH, NORWEGIAN translated by J. T. Craddock, B COM, FIL, Ekard, Ray Park Avenue, Maidenhead, Berks. Maidenhead 24931.

WILFRED E. GOODAY, ARSM, DIC, MIMM, FIL. Member of Translators' Guild, Romanian and French. 161 Rivermead Court, London SW6. RENown 1912.

TECHNICAL TRANSLATIONS from Russian, German and Polish into English. B. Klipstein, B SC(HONS), 1 Glenview Grove, Shipley, Yorkshire. Tel. Shipley 58215.

TECHNICAL AND COMMERCIAL translations from English into Russian. Mrs O. Linsley, 31 Parke Road, Barnes, London SW13. Tel. 01-748 8822.

TRANSLATIONS FROM TURKISH. All subjects. F. P. Scott, 4 Uphill Grove, Mill Hill, London NW7.

TRANSLATIONS: TECHNICAL, SCIENTIFIC, all west-European languages. J. Smuts, B SC (ENGINEERING), FIL, 12 Thorndene Avenue, London N11. 01-360 7723.

TECHNICAL OR COMMERCIAL translations into/from English, German, Dutch and French. A. M. H. Speller, FIL, NGV, 6 Lakeside, West Ealing, London W13. Tel. 01-998 1045.

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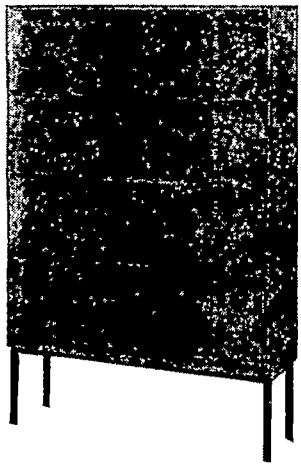

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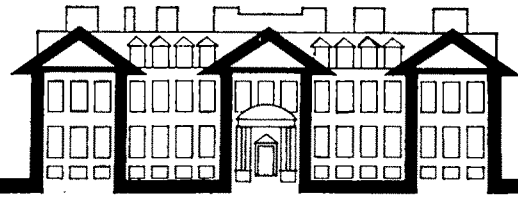

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Public Utilities Information Sources. Edited by Florine E. Hunt, Public Service Electric and Gas Company, Newark, New Jersey. A comprehensive listing of literature covering rates, economics, accounting, regulations, history, and statistics of public utility companies supplying electricity, gas, telephone service, and water. In *Library Journal* list of "Best Business Books of 1966." 200 pages.

Transportation Information Sources. Edited by Kenneth B. Metcalf, late archivist and librarian, Henry Ford Museum and Greenfield Village, Dearborn, Michigan. An annotated guide to publications, agencies, and other data sources concerning rail, air, water, road, and pipeline transportation. In *Library Journal* list of "Best Business Books of 1966." 307 pages.

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COMMUNICATION: A TEACH-IN FOR COMPUTER SOFTWARE SPECIALISTS AND DOCUMENTALISTS

The Retrieval Process
B.C.VICKERY

What Computers Will Do
PROF. STANLEY GILL

Comparison of the Philosophy of Indexing Text with that of Indexing Structural Formulae
A.K.KENT

The Use of the Computer in Information Work
HELEN TOWNLEY

Use of Package Programs for Information Processing
E.MASSEY

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Aslib Proc. vol.19 no.11pp. 347-393 London, November 1967

ASLIB PROCEEDINGS

incorporating Aslib Information

Volume 19 November 1967 Number 11

ASLIB CALENDAR 1967

November

WED.29.	Chemical Group one-day meeting on case studies of computers applied to information work.
THU.30.	Mechanization Study Group open meeting, Aslib, 2.30 p.m. 'Direct access storage devices and their application in information retrieval,' by G. B. Searl (IBM).

December

MON.4–THU.14.	Senior Introductory Course to Special Library and Information Work.
WED.6.	Evening meeting. 'Facts and how to find them,' by Norris and Ross McWhirter.
WED.13.	Scottish Branch meeting at Royal Society of Edinburgh. 6.15 p.m.
WED.20.	Aslib Christmas Party.

1968

January

FRI.5.	Engineering Group. One-day conference on bio-medical engineering.
MON.8–FRI.12.	Course on Co-ordinate Indexing.
TUE.9.	Chemical Group meeting: 'How good is the Kent Service?' by Dr A. Kent. (See paragraph below.)
TUE.23.	Evening meeting. 'The proposed World Institute for Documentation of Housing, Building and Planning.' See paragraph below.

March

FRI.29.	Scottish Branch—Annual General Meeting and one-day conference.

April

TUE.23.	Second Aslib Annual Lecture, by Sir Frank Francis.

Evening Meeting at Aslib

The Economic and Social Council of the United Nations has had under active consideration the establishment of an International Institute for Documentation on Housing, Building and Planning as part of the United Nations system. It was thought to be appropriate that the Institute should be in New Delhi.

Before giving final approval to the project, the Council asked that an Expert Group of four, from India, Czechoslovakia, France and the United Kingdom should undertake a feasibility study and, in particular, report on its role and functions, staff, accommodation, equipment, administration and finance. The Group, of which Mr Agard Evans was the UK member, reported in September 1967.

Aslib members will have an opportunity of hearing a first-hand description of the projected Institute from Mr Agard Evans at an evening meeting on Tuesday 23rd January 1968. Mr E. J. Carter, long connected with Aslib, and until recently Director of the Architectural Association, will take the chair.

Members' Christmas Party

Members are invited to Aslib Headquarters on Wednesday 20th December 1967 from 5.30 to 7.30 p.m. to the annual Christmas party.

Drinks, both alcoholic and soft, and snacks, will be served by the staff.

Admission will be by ticket only, price 10*s* 6*d* per person. Applications should reach Aslib not later than Monday 4th December 1967.

Scottish Branch Meeting

The second Meeting of the 1967/68 session will be held in the Lecture Hall of the Royal Society of Edinburgh on Wednesday 13th December 1967 at 7.45 p.m. Dr W. E. Batten, Head, Central Technical Information Unit, Imperial Chemical Industries Ltd, London, will speak on 'Ghillying for science—rod or net?'

The Branch Christmas cocktail party will precede (6.15 p.m.) Dr Batten's address. Tickets, price 5*s*, should be obtained in advance from the Branch Honorary Secretary, Mr W. H. Rutherford, Royal Society of Edinburgh, 22 George Street, Edinburgh 2.

Use of Biological Literature

An Aslib Biological Group working party would be grateful for information on (*a*) Courses on the use of biological literature or which include the use of biological literature; (*b*) Comments on existing courses; (*c*) Details of individuals or groups who would like to attend such a course, indicating the scope of the course required. Letters should be addressed to Miss P. I. Edwards, 59 Hampton Road, Teddington, Middlesex.

'How good is the Kent service?' (Chemical Group meeting)

Dr A. Kent, Director of the Chemical Society experiment on SDI using the CT and CBAC computer tapes of Chemical Abstracts, will have an opportunity to tell information workers rather than chemists what he feels has been achieved

with the first eighteen months' work at Nottingham University. As it will be the information staff rather than the chemists of an organization who will have to recommend acceptance of the service when it is put on a commercial basis, two users of the 'Kent service', Mr E. Broome (Beecham Products) and Mr B. J. Wilson (Radiochemical Centre, Amersham), will reply to Dr Kent's report and suggest what is still needed.

The meeting will be at 5.30 p.m. on Tuesday 9th January 1968, at Belgrave Square and another user will 'referee' the contest.

DES Committee on Short Courses

The Department of Education and Science has recently set up a Committee to plan and co-ordinate the provision of short courses in librarianship and information work. Members of the Committee include representatives of the Library Association, Aslib, SCONUL, the Association of British Library Schools and the Institute of Information Scientists.

The Committee would like to collect details of short courses planned for 1968 and onwards, so that a directory of short courses can be maintained. Such a list if generally available and regularly updated would have a number of advantages, among them being (*a*) the avoidance of unnecessary duplication, (*b*) reasonable notice to employers and prospective students of courses available and (*c*) the opportunity to identify gaps in the overall provision of courses.

OSTI will be circularizing those with responsibilities in this area, in order to collect the necessary details, in early October.

The Committee would be grateful if anyone who has not received a letter from OSTI on the subject, and who may be able to contribute to this scheme would contact Miss S. V. King, OSTI, State House, High Holborn, London, WC1.

Death of E. Alan Baker

Members will be sorry to learn of the death of E. Alan Baker on Monday 18th September 1967. Alan Baker began his professional career in the public library service and served for many years in the National Central Library. After the Second World War he was librarian of the Ministry of Food Library, and when this was merged with the Ministry of Agriculture he moved to the Ministry of Supply Central Library (later Ministry of Aviation). After ill-health had forced him to retire from regular employment, he did valuable service as Secretary of the Society of Indexers. He served on the Aslib Council from 1955 to 1961, and on the Executive and Finance, Information and Research Committees. He was co-author with D. J. Foskett of the *Bibliography of food* (Butterworth, 1958) and contributed many papers to professional journals. All who knew Alan will remember his kindness combined with affection, his talent for getting people to work for worthy causes, and the cheerfulness and courage with which he faced the last years of declining health.

Development of Computer-based central cataloguing

OSTI has awarded a one-year grant of £24,702 to the British National Bibliography (BNB) to set up a system which will produce regularly, on

magnetic tape, the full bibliographic records of current British books handled by BNB. The systems analysis and programming will be carried out under a sub-contractual arrangement and should be completed in about nine months.

This project will be carried out in close co-operation with the US Library of Congress Project MARC. In 1966, the Library of Congress launched the MARC Pilot Project, which was designed to test the feasibility of producing a standardized machine-readable catalogue record that can be manipulated and given different formats in local installations to serve local requirements. A number of US libraries have been taking part in this pilot project and have been experimenting with the use of the tapes to produce, for example, catalogue cards and book catalogues. The pilot project will be replaced in 1968 by a permanent subscription service, and this service will use a record format sufficiently flexible to meet British and American requirements. The new format is the result of joint consultation between the Library of Congress, the participating libraries and BNB.

Arrangements are being made for a number of British libraries to use the BNB tapes on an experimental basis. One of these is the Bodleian Library to which OSTI has recently awarded a grant of £7,220 so that it can carry out an experiment in the use of machine-readable catalogue records. In addition other applications are under consideration.

Arrangements for the regular exchange of magnetic tapes between the Library of Congress and BNB will mean that UK users will have access to the catalogue records of both countries. It is OSTI's hope that, if the project is successful, it will eventually become possible for all major publishing countries to pool their records in one flexible system.

Dr R. F. Schultze

Members will be sorry to learn of the death of Dr R. S. Schultze, so soon after his retirement (see *Aslib Proceedings*, vol.19, no.3, March 1967). Until recently, Dr Schultze was Curator of the Kodak Museum and Honorary Librarian of the Royal Photographic Society. He will be remembered as an outstanding figure, particularly in the field of photographic and documentation standards.

COMMUNICATION: A TEACH-IN FOR COMPUTER SOFTWARE SPECIALISTS AND DOCUMENTALISTS

A joint Meeting of Aslib and the British Computer Society Information Retrieval Specialist Group

Friday 21st April and Friday 30th June 1967

Chairman: W. E. BATTEN

I HAD the pleasure of taking the chair at the second presentation of this teach-in (having presented a brief paper—not here reported—at the first). It has been decided to base this report primarily upon the June session, partly to avoid repetition, but mainly because, in the light of experience, we did a slightly better job in June.

It would be optimistic to claim that the meeting achieved complete understanding between the two elements. I say this with all possible respect to both speakers and audience; perhaps we were seeking to do what cannot be done in one day and with a large audience. If we have learned anything from the experience it is that the happy marriage of documentalist and systems analyst will not spring from a brief encounter.

The 'discussion' is, of course, the test of a day's 'communication' of this kind.

It was, I suppose, inevitable that most of the questions raised should relate to either (*a*) the semantic basis to be chosen or (*b*) the magnetic file organization to be adopted. Few raised questions of their interrelationship, which in itself amply demonstrated the need for such a teach-in.

To avoid tedium, and so as not to add to the information explosion, it has seemed to me appropriate to offer a summary of the discussion rather than present question and answer verbatim. For the liberty thus taken I ask the indulgence of all concerned.

THE RETRIEVAL PROCESS

B. C. VICKERY

Head of Research Department, Aslib

BEFORE documentary information can be used, a complex series of operations have to take place: 1. information must be recorded in documents, 2. each document must be stored with others in some accessible place and its location known, 3. characteristic aspects of each document must be identified, to form a document profile, and this must be recorded with others in some file, 4. the potential user must formulate some query or express some interest in terms of characteristics recorded about documents, 5. this user profile must be compared with document profiles and the locations of matching documents identified, 6. the documents themselves must be located and presented to the user.

Each of these operations can make use of data processing equipment, although this use is not at present typical—many documentary operations are still manual. Our attention today will be directed to two main problems—the matching of user and document profiles, and the features that these profiles must have to maximize the chance that matching documents will meet user needs. It is these operations that make up the problem of information storage and retrieval.

The necessity for document profiles is fairly obvious. Each document is a more or less complex record, sometimes less than a hundred words in length but sometimes running into tens of thousands. It is sought by the user for the information it contains—and so must be identifiable by some label or key representing this information. In general, however, each document has many characteristics that may serve as search keys, so it must be identified by a whole set of such keys—and it is this set that we call a document profile.

Let me give one example. The National Aeronautics and Space Administration prepares a bibliographic record for each report or journal article published in its field. The document profile consists of keys which may separately or jointly be included in a user search profile. Among these keys are some characterizing the origin of the document (the individual or institution who produced it, its date, language, and security classification) and some characterizing its subject content—terms such as Electron, Flux, Ionosphere, Magnetic, Radio and Satellite (see Figure 1).

Keys characterizing documentary origins are relatively straightforward. They are usually easy to identify from the title-page of a document, and are self-standardizing—for example, an author generally spells his name in only one way in each document he writes and a potential user often knows the right spelling. Subject content keys are far less straightforward. Within even a short document there may be many subjects that could be chosen as characteristic, so problems of selection arise. Moreover, the same subject may be expressed quite differently by different authors and different users—or even by the same author on different occasions—so that some standardization must be introduced during the storage and retrieval process.

The whole process can be analysed into seven stages: 1. a decision is taken as to what kinds of key will be used to identify documents, 2. appropriate keys are derived from or assigned to each document, 3. the keys so selected may be standardized and/or coded, 4. a physical record is prepared, associating the profile with a location symbol for the document, 5. all the records so prepared are filed, 6. a profile expressing some user query or interest is prepared, standardized and coded if required, 7. the user profile is compared with document profiles and, for some specified degree of matching, appropriate document locations are obtained. I will briefly comment on each of these stages, restricting my remarks to the more difficult type of key that characterizes subject content.

1. The kinds of subject key to be used will depend upon the purposes that a retrieval system is designed to serve. Potential users may have a very specific interest—in, say, individual chemical substances—and the keys selected may be of only this type. On the other hand, users may be potentially interested in any topic occurring in the documents, so that no limit is placed on the type of subject key to be selected. If users wish to receive only such documents as deal extensively with a topic, only the main subject of a document will be selected as a key. On the other hand, if every scrap of information about a topic is required, minor themes will also be selected. Many considerations of this kind will determine the kinds of key to be used.

2. Deriving subject keys from a document is known as indexing (computer men use this term in a different sense). As far as operating retrieval systems are concerned, indexing is still a human art. Experimentally, computer methods have been used (either by matching machine-readable text against a previously chosen list of keywords, or by counting text words and extracting those that occur most frequently). But operationally, indexing requires human scanning of a document, to decide what it is about and to state its subject themes. In some systems, this scanning is done by the author, who states the subject in a title which is later used as the document profile. In most systems, experienced indexers are employed on the job. They are guided by the decision made in stage 1.—as to the kinds of key they are to look for. They may also be guided by being supplied with a standard list of keys to be assigned to documents. In this case, indexing necessitates mentally matching themes selected from the document with themes as expressed in the standard key vocabulary.

3. Whether or not standard indexing vocabularies improve retrieval is at present a matter of dispute. The generalized argument for them seems convincing. Since both authors and users employ subject words inconsistently, it

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TITL A STUDY OF THE IONOSPHERE AT MID LATITUDES, BASED ON TOTAL ELECTRON CONTENT SCIENTIFIC REPORT, JUL. 1961-JUN. 1962

AUTH HIBBERD, F. H.

PAAF (Personal author affiliate)

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NOC TOTAL ELECTRON CONTENT OF IONOSPHERE DERIVED FROM SATELLITE DOPPLER MEASUREMENTS

TERM 1CONTENT (1 = unpublished term)
1DISTURBANCE
3DOPPLER EFFECT (3 = published term)
3ELECTRON
1FLUX
3IONOSPHERE
1MAGNETIC
1MEASUREMENT
1RADIO
1SATELLITE
3SATELLITE MEASUREMENT
1SOLAR

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NS NASA support
NF No foreign
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ET Et al
LA Last analytic accession
SO Source
FO Foreign origin
NP Number of pages

FIGURE 1

would seem that user and document profiles would be more successfully matched if the keys in both were standardized. Many systems do use standard vocabularies—subject word lists, nowadays known as thesauri—but some computer-based systems use as keys whatever words are found in texts, and some experimental work suggests that their performance does not suffer. If a system does use a standard vocabulary, its construction requires a good deal of intellectual effort, to condense the manifold and varied words found in texts to a controlled minimum list. The study of techniques of vocabulary construction is at present much in evidence.

The next step may be to translate keys into a code. Many systems do not include this step, but use natural language words as keys. Codes may be used to decrease the amount of space needed to record keys, to maintain them in a desired filing sequence, and to express relations between them.

4. Once indexing has been completed, a document record can be prepared. This can be relatively brief: a simple document location symbol associated with a small number of coded keys. The record can in some systems be quite extensive, if it is subsequently to be manipulated in complex ways. Figure 1 illustrates the record prepared for each document in the National Aeronautics and Space Administration system: many characteristics are recorded, some as retrieval keys, some for other manipulative purposes, others for delivery to the user as retrieval output.

5. Whether simple or complex, from the retrieval point of view a document record associates two types of characteristic—a location symbol for the document, and retrieval keys. If we consider now a collection of records, we can represent the resulting structure as a matrix (Figure 2).

Documents or item	Keys or terms A	B	C	D	E	F etc.
1	X			X		
2		X	X			
3		X			X	
4			X			X
5	X				X	
6		X				X

FIGURE 2

In a physical file, the matrix can be partitioned either horizontally or vertically. In the former, each unit record consists of one document or item symbol and all the key or term symbols associated with it; in the latter, each unit record consists of one key or term symbol with all the document or item symbols to which it has been assigned. These two forms of organization have been used both in manually searched files, and in computer storage devices.

6. User profiles may be of two kinds—those expressing individual queries posed to the system at a particular time, and those expressing wider and more

permanent user interests that are to be regularly matched against new document profiles coming into the system. If document profiles are constructed from a standard vocabulary, then user profiles must be similarly constructed. If the keys in document profiles are drawn freely from text words, then the user may have to allow for the variability of text: to be sure of successful matching, he may include in his profile all the variant words that he thinks authors may have used to express the subject he seeks.

Even if a somewhat standardized vocabulary is used, it may improve retrieval if the user amplifies his profile by including keys significantly related to those first used to express his subject. To aid his choice, standard lists or thesauri usually include extensive cross-references, showing how subject keys are related (Figure 3).

7. The user profile consists of a set of keys to be compared with document profiles. The simplest form of matching is to require that all user keys must be present in the profile of a document before the latter's location is reported. The acceptable criterion for a match can be complicated in various ways. (*a*) We can require that only some percentage of user keys be present. One variation of this is that the ratio (number of matching keys)/(number of keys in document profile) must exceed a certain minimum. (*b*) We can give user keys various weights, and require that the computed total weight of matching keys must exceed a certain minimum. (*c*) We can form logical combinations of user keys—requiring that the document profile contain key A *and* (B *or* C *or* D) *and* (E *or* F) *but not* G.

Matching may then take place visually or mechanically. The user is notified of matching document profiles—he may be presented with a bare location symbol, or with a full record as in Figure 1, and ultimately with the actual document. Then his real work starts—he must extract information from the document. Since this takes time and effort, there is a need for true data retrieval systems in special fields. But these present intellectual and technical problems an order of magnitude greater than those we are discussing today.

I have outlined seven stages of the retrieval process, and noted some of the problems associated with them: the importance of assessing potential user needs in deciding what keys to use in the system; the need for human analysis of texts to identify what keys should be assigned to them; the use of standard vocabularies, displaying keys and relations between them, as an aid to both indexer and searcher; the intellectual effort needed to construct such vocabularies, which may be of considerable size; coding methods; the need to accommodate an extensive document record including many keys by which search access may be sought; various methods of file organization, which may critically affect the economics of the system; the need for imagination in the construction of user profiles; varied forms of search strategy.

All these problems and choices arise irrespective of the physical form of the file—whether it is in the shape of a well-thumbed notebook or an on-line disk store. All aspects of the process—and indeed others that I have not mentioned today—must be borne in mind in the design of retrieval systems.

Saponins use GLYCOSIDES

SAPPHIRES
(Mineralogy)
Specific to:
CORUNDUM
GEMS (MINERALS)
MINERAL PRODUCTS
MINERALS

Sarcoma use CANCER

SATELLITE NETWORKS
(Space Technology)

Satellite rendezvous vehicles use
RENDEZVOUS SATELLITES

SATELLITE ANTENNAS
(Antennas)
Specific to:
ANTENNAS
Also see:
RADAR ANTENNAS
TELEMETERING ANTENNAS

SATELLITES (ARTIFICIAL)
(Spacecraft)
Specific to:
SPACECRAFT
Generic to:
BOMBARDMENT SATELLITES
COMMUNICATION SATELLITES (ACTIVE)
COMMUNICATION SATELLITES (PASSIVE)
LUNAR SATELLITES
METEOROLOGICAL SATELLITES
MILITARY SATELLITES
NAVIGATION SATELLITES
RECONNAISSANCE SATELLITES
SCIENTIFIC SATELLITES
SOLAR SATELLITES
SYNCHRONOUS SATELLITES
Also see:
SATELLITE NETWORKS

SATURABLE REACTORS
(Electrical & Electronic Equipment)
Includes:
Reactors (Electrical)
Saturable-core reactors
Saturable transformers
Specific to:
TRANSFORMERS
Also see:
FLUXMETERS
MAGNETIC AMPLIFIERS
MAGNETIC CORES
POWER TRANSFORMERS

SATURN
(Astronomy)
Specific to:
PLANETS

Saurians use REPTILES

SAW BLADES
(Industrial Equipment & Tools)
Includes:
Hacksaw blades
Specific to:
SMALL TOOLS

SAWS
(Industrial Equipment & Tools)
Includes:
Band saws
Circular saws
Hand saws
Power saws
Specific to:
SMALL TOOLS
Also see:
MAINTENANCE TOOLS
TOOL KITS

SC use SUBMARINE CHASERS

SCALE
(Abstract Concepts)

Scale theory use STATISTICAL ANALYSIS

SCALERS
(Electrical & Electronic Circuits)
Includes:
Scaling circuits
Specific to:
CIRCUITS
Also see:
COUNTING METHODS
RADIATION MEASUREMENT SYSTEMS

Scaling (Psychology) use
PSYCHOMETRICS

Scaling hammers use CHIPPING HAMMERS

SCANDIUM
(Chemical Elements)
Specific to:
GROUP III ELEMENTS
METALS
TRANSITION ELEMENTS
Also see:
RARE EARTH ELEMENTS

FIGURE 3. *Sample page from DDC Thesaurus*

WHAT COMPUTERS WILL DO

PROFESSOR STANLEY GILL

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INTRODUCTION

MY objective is to give a thumbnail sketch of the computing art, and perhaps to kill a few fallacies on the way. One fallacy which I will tackle right away is the idea that computers are essentially for numerical computations, and that if they do anything else it is, like Dr Johnson's description of a woman's preaching, 'not done well, but it is surprising to find that it is done at all'. It is true that numerical computing was the umbilical cord on which the electronic computer was born; but the digital computer uses pulse patterns to represent the data, and there is nothing essentially numerical about the pulses.

The term 'binary digit' or 'bit'* certainly abounds in computing, but no longer implies any numerical significance. It happens that practically all the data representations used within computers are made up of two-state elements—presence or absence of a pulse, punched or unpunched position on a card, and so on. A group of n elements serves to distinguish one of 2^n possibilities; thus there are thirty-two possible combinations of five elements, which suffice, for example, to denote the letters of the alphabet. In talking about codes of this kind one needs a pair of symbols to stand for the alternative states of an element. Since, historically, the commonest type of data was numerical, represented in the binary scale with one element for each binary digit, so an element has come to be called a 'binary digit' and its states are denoted by the symbols '0' and '1'.

The fact that a computer's store could equally well hold either numerical or non-numerical information made possible the most crucial step in the development of the modern digital computer, the stored program. The data, and the program of instructions for operating on it, are now held alongside one another in the same store. The data may or may not be numerical; the program is certainly not.

The introduction of the stored program increased enormously the versatility of computers, in two ways. First, since the whole program was available for reference at any instant, the machine could be instructed to jump from point to point in it, perhaps repeating a part of it; and the jumps could be made to depend on values just computed, so that the whole course of a calculation could be dependent upon the data. Secondly, the instructions became accessible for processing as well as the data, and could therefore be modified by the computer

* 'Bit' was originally coined as a unit of measure, the amount of information contained in one binary digit, but the distinction has been lost.

(in response to other instructions) before or even during the execution of the program.

These possibilities, combined with the great speed offered by electronics, were soon exploited, and programs containing many thousands of instructions began to appear, enabling computers to pick their way through quite tortuous calculations.* So great was the flexibility of the computer compared with earlier devices that it came to be said that 'any task that can be stated in plain English can be programmed for a computer'. This was of course only an approximation to the truth; in particular it glossed over the very big task of programming, which I will come to later.

COMPILERS

A typical task to be performed by a computer involves taking in some data, deriving some results from it, and putting out those results (e.g. in printed form). To prepare the computer for the task it must first be fed with the program. Acting on the program, the computer then takes in the data, often through the same input device (e.g. card reader). The data may, as I said, be either numerical or non-numerical (or a mixture).

In exploring the potentialities of computers, it was not long before attention was turned to the possibility of treating a program, written for one purpose, as data for some other purpose. Among the problems that can be considered for solution is the following: 'Given, as data, a program for computer X together with a set of data for this program, find the results that computer X would produce'. This may be considered as a task for *any* computer. If computer X itself happens to be available, the task is trivial; for any other computer it is necessary (and possible) to write a program for the task. If properly written, the same program should suffice to handle *any* program that is valid for computer X. It is effectively a simulating program; it instructs the computer in which it runs to simulate the actions of computer X.

Such programs are now commonplace. Two principle methods are employed: the interpretive method and the translator method. In the former, computer X is imitated in detail; its instructions are held in their original form in the simulating computer, and are examined one by one in the sequence in which they would have been obeyed by computer X, each operation of which is reproduced (perhaps in a roundabout way) by operations of the simulating computer. The translator method involves an initial translating phase, in which the program for computer X is translated into a program for the simulating computer, which can then be obeyed directly and which will produce the same results that computer X would have done with the original program.

Note that computer X need not exist, but it must be precisely defined if the task of simulating it is to be defined. Given this, the simulation can be performed independently of the existence of X. In fact, we can postulate some very odd computers and run programs 'on' them, provided only that they are well defined and that we write the appropriate interpretive or translator pro-

* Owing to the repetitive nature of any large calculation, a program of a few thousand instructions will in practice suffice to specify a task involving many millions of operations.

grams for some actual computer. In postulating a computer we are essentially inventing a language for expressing programs, for each computer has its own set of meanings (i.e. operations) with which it responds to the instructions that it is given. Thus, by the use of interpretive or translator programs we are freed from the need to use the inherent programming language of any actual machine, but can invent our own, tailored perhaps for our personal convenience.

The art of inventing programming languages has come a long way. There are several popular ones (ALGOL, COBOL, FORTRAN) that are so superior (for the human programmer) to any actual machine language that they are usually described collectively as 'high level' languages. A translator program for one of these is usually called a 'compiler'.

In fact, several hundred programming languages have been invented, but comparatively few of them have come into widespread use. Some of the very popular ones (especially FORTRAN) exist in large numbers of variants. This has led to great concern over compatibility and standardization, which I will return to later.

USING THE STORE

If we were able to stick to one strictly defined programming language, it would appear that by the use of compilers we are freed from dependence on the actual hardware design of computers. We have only to provide the appropriate compiler for each computer that comes along, and any program in the common language can then be run on it. For a large class of programs, this is true. But for some jobs, the design of the hardware must intrude into the programming of the individual job. The hardware feature that gives most trouble is the store. Since no physical storage device combines the desirable properties of high speed and low cost per bit, most computers embody a hierarchy of devices ranging from magnetic tape, discs or drum (cheap and slow) to magnetic cores (fast and expensive). In addition, a computer usually has a handful of very fast registers which are in continual use. Various computers have various sizes of core store and various numbers of high speed registers. It is often hard to design a compiler so that the programs which it translates will make efficient use of the actual combination of storage devices available. In recent years various forms of 'one-level store' scheme have been tried which by a combination of special hardware and interpretive program seek to make efficient use of a composite fast and slow store, on programs written without this store structure in mind. While generally fairly successful these schemes are not infallible and there is room for much improvement.

A task that is very sensitive to the design of the computer is sorting. It is possible to sort large volumes of data quite quickly on a small, cheap computer equipped with magnetic tape units; the data is passed back and forth through the computer from tape to tape, like wagons in a shunting yard. But the actual procedure depends critically on the number of tape units available and on the capacity of the computer's internal store.

In a job that involves information retrieval, too, the approach may well depend on the configuration of the computer. For such jobs there is now an increasing use of disc stores, which can be made with capacities of the order

of 10^9 bits, to which access can be obtained within a small fraction of a second. It may therefore be feasible to store the whole of a large file in such a device, and to be able to respond immediately to inquiries relating to it. Big advances are coming in this field. At present most applications involve only simple file references, but there is great scope for handling complex inquiries that call for deductions to be made from a combination of file items. This work will benefit, in due course, from the present research in theorem proving by computer, which is making steady progress.

There are already several very successful quick-response information retrieval installations, most of them dedicated to one job only (e.g. airline reservations) with one program permanently in the computer. However the majority of computers accept a variety of jobs, and hence have a scheduling problem: how to minimize the idle time, and get a mixed stream of jobs through the machine as quickly as possible. A large machine is designed to overlap the reading of one job with the execution of the previous one, if possible, and with the output of results from earlier jobs. The management of this process calls for another program, called a supervisor, a master program that treats the individual jobs as its slaves. Modern supervisors do a complicated job of store management, since many batches of data are in the store at the same time, and some achieve a high degree of time-sharing of the central processing unit (the part of the machine that executes instructions), which is switched frequently from one task to another.

This time-sharing ability is essential if the machine is to serve many users, connected by telecommunication links, any of whom may demand a rapid response. A modest number of such systems is now in use, and has set a new standard of convenience for many types of work. It is now generally agreed that this kind of service will expand and spread, and that the computers will be linked not only to their users but also to each other, thus forming a computer network or grid, the combined resources of which could be available to any subscriber. Besides sharing the computing power, such a grid would allow the ready interchange of information between users. The supervisor programs would, however, have to be much more comprehensive than those in use today.

SOFTWARE

The compilers and supervisors make up the major part of what has come to be known as the 'software', i.e. the collection of standard programs that are needed with a computer to enable it to be used. The software of a computer forms an elaborate logical structure based on the design of the hardware, to which one must add first some elementary programs for controlling the card readers, printers, etc. ('input-output routines'); then some translators for high level and low level languages (compilers and assemblers); a supervisor or two; and finally some 'applications packages', i.e. groups of programs of general utility for such classes of work as statistics, text editing, linear programming, etc. Each layer of the software uses facilities provided by an earlier layer, and performs some services that are available to the next layer or to the ultimate user.

The software industry is now running at several hundreds of millions of dollars per year. It has become very big business, in a strange new field, close to symbolic logic, about which we understand very little. Its troubles are not diminishing. They used to show merely as bad estimating, inefficient programs, and duplication of effort. An expensive software structure is perilously vulnerable to changes (such as 'improvements') at its base, e.g. new hardware which frequently mean starting afresh.

These troubles are still with us, but now, as jobs get more complex, we are also running into semantic problems. I quoted earlier the saying that 'any task that can be stated in plain English can be programmed for a computer'. Unfortunately not every task can. Worse still, it is easy to think that a task has been stated clearly when the statement is in fact ambiguous. This is especially true in compiler writing. The task of a compiler is to deal appropriately with a particular programming language, and the specification of this task is essentially a language definition. We now have a sufficient understanding of syntax definitions, but we still have no satisfactory way of giving a complete definition of a programming language.

HANDLING TEXT

Natural languages are notoriously difficult to define. There are lots of tempting things waiting to be done by computer with natural languages, once we achieve adequate definitions of them.

The definition problem has bedevilled standardization in the computer field, certainly of programming languages. There are simpler standardization tasks, such as the bit codes for representing printed characters, where we are making good progress so far as the main bulk of applications is concerned, but even here there are big problems still looming ahead. The advent of computer-controlled typesetting will encourage the introduction of larger character sets, and it remains to be seen whether we shall succeed in standardizing on a small number of common sets and so limit the variety of keyboards and printers that will be demanded. Any attempt to feed the contents of large libraries into computers would run into even bigger coding problems.

At present, virtually all the information (both data and programs) that goes into a computer has been typed on a keyboard by someone, and this is another of the present obstacles to using computers. Character recognition is on the way but will take a few more years to come into regular use; it might, in the long run, do something to ease the character set problem by reducing our dependence on keyboards.

The idea of feeding a book or document into a computer by simply putting it into a photoelectric reader brings us to another matter: some of the content of books does not consist of characters of any sort, but of diagrams and photographs. One can, at a price, put these into a computer store in digital form, but this is vastly more expensive than photographic reproduction. Even if, one day, all the text goes into computers, the chances are that the illustrations will be stored separately in some kind of photographic file.

CONCLUSION

I seem to have been mostly concerned here with what computers will not do. What they will do, very fast and often very economically, is a possibly very complicated job once it has been clearly defined and programmed, which may take many man-years. The limitations come mainly in defining the job and getting the program written and checked. Lesser limitations may come in getting the data into the machine, and possibly in the speed and capacity of the various stores, magnetic tapes, printers, etc., though these are much less of a limitation now than they used to be.

COMPARISON OF THE PHILOSOPHY OF INDEXING TEXT WITH THAT OF INDEXING STRUCTURAL FORMULAE

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AT the Chemical Society Research Unit in Nottingham we are providing a service to some two hundred and sixty research chemists in which we search magnetic tapes produced by Chemical Abstracts Service of Columbus, Ohio (CAS), and which appear in a published form as *Chemical Titles* (*CT*), and *Chemical-Biological Activities* (*CBAC*). In the course of this activity we are continuously presented with the problem of defining the interest of the user in a way which makes it possible to pull out from our information files those elements of information that are of most interest to him. In our particular system we do not rely on any pre-indexing process, but rather input the data in a virtually unmodified form. When we are searching this information file we produce a search profile which defines the information of interest by means of a set of logically associated keywords or key phrases, which may be contained in the title, in the case of *Chemical Titles,* or in the digest material, in the case of *Chemical-Biological Activities,* stored on the magnetic tape. Consequently my experience is most heavily directed towards that of searching free language information files, which have not had any great intellectual effort put into their input phase. Nevertheless I shall attempt in this paper to say something about the philosophy of indexing of text, and discuss whether substantial indexing is always necessary or even desirable, and to compare this process with that of indexing structural formulae, whose syntax and semantics are much less complicated than those of the English language.

The research chemist who produces new or interesting information generally publishes this information in papers produced and printed by primary journals. The information contained in these papers is in the form most usually of descriptive text, but also may appear as data in tables, figures and graphs, or as structural formulae, often in the form of reaction equations. The user of chemical information is concerned to extract from the large quantity of information available and published in this field (for example *Chemical Abstracts* publishes over a quarter of a million abstracts of papers of chemical interest in a year) those elements of it which are of particular interest to him. The purpose of an index is to anticipate the way in which the user of this information may wish to access the information subsequently. Whatever the form of the information, decisions which are made regarding indexing are conditioned by this require-

ment that they provide a number of pathways by which the user may access information of interest. Thus an index should provide a number of access points to the file of information that the user is concerned in searching, whether this file of information be descriptive text, or structural formulae, or data extracted from tables and figures in original papers. There would appear to be two quite different approaches which may be adopted to the problem of indexing information of whatever kind it may be. The first approach is to perform an indexing function at the point of input of information to the information file. The second approach is to input the data in a virtually unindexed form, and perform the indexing function at output of information, that is as a part of the function of searching.

We should consider the first approach first since this is the conventional method, and the method which has been described by Dr Batten, and is mentioned by Mr Vickery in other contributions to this symposium. There are many ways in which a body of text forming an information file may be indexed at the point of input. Dr Batten has described the approach of co-ordinate indexing in which keywords or key phrases, which describe the content of the paper, are tagged to the information, often a number of such keywords or phrases to each item of information, and these tags provide the access points subsequently for searching purposes. The keywords or phrases used are generally speaking selected from a carefully defined thesaurus of terms covering all those aspects of interest within some particular limited or relatively limited field. In searching, the user is able to co-ordinate one or more of these tags, and to extract from the information file by this method all those pieces of information which simultaneously contain the co-ordinated index terms. There is obviously considerable intellectual effort involved in this approach. Firstly in the construction of an adequate thesaurus of terms which is at the same time comprehensive, and yet not so large as to be incomprehensible. Secondly in the process of tagging items of information with appropriate index terms. This is a job which can only be done by a trained specialist in the field who must make subjective, and sometimes arbitrary decisions as to the allocation of particular index terms to particular pieces of information.

In another form of indexing, that which is adopted by the main subject indexes in *Chemical Abstracts,* the items of information are tagged with numbers in some chronological order, and then divided into areas of broad subject interest. Within these broad subject areas, each paper is given an access point or several access points through the use of some descriptive phrase, which is permuted about each of the significant items contained within it; these significant items being pulled out to the left margin of the index to aid in visual inspection of the index. The index entries are again as in co-ordinate indexing a job for a specialist, who must examine the paper, consider what short phrase or set of phrases may be best used to express the intent and content of the paper, and then permute this set of phrases in a consistent and comprehensible way in the index that is produced. Dr Michael Lynch at Sheffield has studied the logical processes involved in the production of such indexes, and has been able to detect a very consistent pattern adopted in the index. He has in fact proposed that it would be possible by careful choice of suitable phrases to generate by

machine the final version of the index. Nevertheless the job of producing and choosing the phrases to be input to the machine remains the function of a specialist in the field of the information being indexed.

Other types of index for indexing text are available and used in a number of commercial publications. For example the KWIC index introduced by Luhn is used in *Chemical Titles* as a method of providing a number of access points to any given title contained in the particular volume concerned. In this approach every significant word in a piece of text is brought into some central or readily identifiable position. These keywords are then alphabetically ordered to produce a listing in alphabetical order of keywords within each title. The user may scan this list with his particular keywords in mind, and thus locate papers of interest to him. In general the choice of keywords is done in a passive way, in that the words which are not to be considered keywords are put into a stop list of words not to be indexed. There is no reason, however, why the opposite approach should not be adopted, and those words of interest flagged in some way to be treated as keywords while the remainder are ignored.

Another possible approach is the so-called Keyword-Out-Of-Context or Keyword-And-Context (KWOC or KWAC) index. In this each item of information is listed below a keyword contained in that particular item of information. All the items of information which contain a particular keyword are listed beneath that keyword which is normally pulled out to the left margin in a printed publication so as to aid the searcher in locating his particular interest. Both the KWOC and the KWIC methods of indexing are essentially non-intellectual processes, and have been conceived largely to serve the needs of mechanized indexing systems. Nevertheless all these forms of index serve the function of providing the user with as many possible access points to the information as can reasonably be provided. In the case of co-ordinate indexing or the CA type of index, considerable intellectual effort is involved in selection of these access points. In the case of KWIC or KWOC relatively little intellectual effort goes into these processes; they depend for their success on the provision by authors, for example, of titles which are adequate index entries.

The problem of structural formula indexing is essentially the same as that of text indexing in that it is necessary to provide for the user a number of points of access to stored information relating to structural formulae. These formulae are graphical representations of the spatial arrangements of the atoms, and their connections, in any given chemical molecule. They appear in published papers in the form of these graphs. The most usual way of providing an index to structural formulae is to make use of some sort of chemical fragment code. In these codes certain well defined chemical structures are allocated numbers or letter sequences, and each molecule may then be defined as containing one or more of these basic elementary structure fragments. Additional information relating to stereochemical properties of the molecule or other features which relate to its structure may also be coded in the same way. These codes may then be treated in effect as though they were text, and indexed using essentially the same processes as we have seen for use with texted material; for example co-ordinate indexes or KWIC indexes may be used to ease the problem of the user in locating information which is of interest to him.

The index, whether it is an index of text or structural formulae, serves the purpose of easing the user's problem in locating relevant information in some large file of information. However, for manual searching it is obviously quite impractical for the user to search the whole text of all papers likely to be of interest to him, or indeed of all papers in the field of chemistry in order to unearth those of particular interest to his own needs. Indexing processes must therefore anticipate the requirements of the user, and be designed so that those access points which are required will be made available in the index. It is not always possible to achieve this result, and consequently information may be lost through being inaccessible because no index entry points were provided for some particular concept. The alternative approach is to abandon any attempt at indexing the information at input, but rather to delay this function until the actual and specific search is being performed. Thus the titles of papers of interest, or the whole text of abstracts of these papers, or even possibly the whole text of the paper itself are stored in some machine readable form in a computer file. The user who wishes to access this information must then concern himself with decisions regarding the way in which the information will have been presented in the original work, either in the title, digest or full text, and will have to provide to the system a list of terms or keywords which will be matched against the information file in some logical way in order to capture the relevant information. The user in effect is performing a post-indexing task on this information. He is left free to make decisions regarding the nature of the index terms that he wishes to use, though obviously he must constantly bear in mind the way in which the original information may have been expressed.

The magnetic tape searches on *Chemical Titles* and *Chemical-Biological Activities* are based on this principle of selection of search terms as post-indexing terms which are matched against a relatively unedited and uncontrolled file of information. Structural formulae may be stored in a computer file for searching by a similar approach in a number of ways. Perhaps the most valuable is the method which is used in the *Chemical Abstracts* Compound Registry System. In this approach a structural diagram of the compound of interest is input to the computer, and converted into a unique connection table or matrix, and stored in this form on the magnetic tape file.[1] In this connection table the presence of every atom and its bonds and connections, together with items of information concerning ring closure points and stereochemistry, is stored. The file in effect contains a complete description of the structure of all the molecules which have been entered on to it. Perhaps the most common requirement of a chemist for structural information is to discover the existence of compounds containing certain well-defined chemical structures which may be of some interest in his particular work; for example, may potentially possess particular biological activities. By means of sub-structure searching techniques it is possible to match these sub-structures against the unique connection table matrices stored on the magnetic tape, and to pull out from this tape all the parent structures which contain a particular sub-structure.

The use of unique connection tables is, of course, not the only acceptable method for storing structural formulae for access by this technique of free searching. A number of notation systems for describing chemical structures

have been developed over the past ten or fifteen years. These include, for example, the Dyson notation, and the Wiswesser notation.[2] The Wiswesser notation at least was primarily designed to provide the chemist with a tool for writing the structure of a compound in some unique fashion without the need to draw a structural formula, and using only those symbols available to him on a standard typewriter. The notation for any compound may be stored on a magnetic tape, and searched in precisely the same way as the unique connection table by specifying nominated notations or parts of notations, and looking for these on the accumulated file. In fact these notation systems are not quite so powerful as the unique connection table approach, since, in order to reduce the symbolism involved, in many cases one symbol in the notation stands for a number of atoms arranged in some particular fashion. There is therefore a compromise in the use of notation systems between a completely free method of storing the data at input and an indexing method of storing the data at input, and some intellectual decisions must be made by a specialist in order to determine what the proper notation for any particular compound may be.

I have attempted to indicate throughout this paper that there are no essential differences between structural formulae and text in the processes involved in indexing. Obviously the practical methods of indexing differ very considerably from one type of information to another, but the end product or end intention is to produce a variety of points of access to the information stored in the file, whether this be structural formulae or free text. These access points may be provided by considerable intellectual effort at the point of input of the information by use of co-ordinate indexing or similar techniques or with less intellectual effort by the use of KWIC and KWOC indexes. Alternatively, indexing may be left until the output phase of the process, that is during search. Each method has its particular advantages and disadvantages. For non-machine searching clearly a properly prepared manually searchable index is the only answer to the user's problem, but if the user has access to a machine, and particularly to a computer, it may be argued that there is some merit in storing the information in a relatively undigested form, and only performing the indexing function at the time of search. This is because despite all efforts to produce comprehensive thesauri, needed for proper use of co-ordinate indexing, or to make the most effective index entry points in an index of the type of *Chemical Abstracts*, inevitably a number of points of access are omitted, since the indexer at the time of input was not aware of their significance or importance. Indexing at input does significantly reduce the effort required by the user to locate relevant information but, if not performed with the greatest care, can lead to loss of information. Indexing as part of search increases the demands on the user, but permits of considerable economies at input, and retains all possible access points intact.

REFERENCES

1 MORGAN, H. L. *J. Chem. Doc.*, 5, 107 (1965).
2 National Academy of Sciences publication number 1150 'Survey of Chemical Notation Systems' (1964).

THE USE OF THE COMPUTER IN INFORMATION WORK

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THE type of search programme we can use depends on the way in which the information is stored within the computer. There are two principle techniques for arranging the files of information about your documents—the item file, in which the record is the document, its identity, its title, etc., and all its descriptors; and the inverted file, in which the record is the descriptor followed by the identities of all the documents to which it applies. Generally speaking, an item file is usually held serially, most commonly on magnetic tape, whereas an inverted file is usually held in a random access device. The reasons for this will become clear later when we discuss the programs.

The programs for these two different types of file are, of course, quite different; each has its own advantages and disadvantages. For instance, with item filing you can carry alongside the descriptors the full citation and an abstract—or even the full text, if you have room—and once you have found the particular combination of descriptors that matches your inquiry you have, immediately available for output, the complete bibliographical information that you require. But if you have inverted filing the first result of the search program is only a list of the identity numbers of the documents relevant to your inquiry; you've got to look these up, either manually or by computer (again, it is easier from some sort of random access store) to get the full citation. Another advantage of item filing is that once you have got your full record into the computer you will never have to add anything else to it; but with inverted filing, where your record holds the identities of the documents having this particular descriptor, you have to go on adding to that record as long as you go on receiving documents to which this descriptor applies. Your record, in fact, has to be capable of indefinite expansion. You will probably, from the start, be pretty sure that certain descriptors will be used much more frequently and certain others much less frequently, and you will be able to tell your programmers this and get your files so set out that the most commonly used are the most readily accessible. But at best this will be something of a guess and your filing organization has to be pretty flexible with an inverted filing system. Apart from anything else, there is always the chance that a little-used descriptor may suddenly, with a new slant on research in the subject, spring to the fore; if possible there should be a sub-program allowing for the rearranging of the descriptors as and when required.

Another disadvantage of inverted filing is that if you change your vocabulary you may need to re-index some items and for each such item you have to look up the file for each of the descriptors it already has, delete (if necessary) the positive reference in that record and then look up the records for its new descriptors and add it to them; with a serial file, if you want to make a change of descriptors for any one record you only need to locate that record.

On the other hand, with an item file, every record must be searched for every inquiry; whereas, of course, with inverted filing you need examine only the descriptors included in the inquiry and your search is therefore much faster and can be a real-time, on-line application.

With an item file you can look for several inquiries simultaneously. With inverted filing you can only do one search at a time.

A final advantage of inverted filing is that you can very quickly find out not what documents answer a particular inquiry but *how many*. It is quite possible that you may have defined your inquiry so badly that out of your total store of, say, 20,000 documents you retrieve 2,500. This is going to be quite useless. It is convenient to have a program which (usually through the typewriter) says, not 'here are the documents relevant to your inquiry' but, in effect, 'look here, old boy, you've got 2,500 answers to this—is this *really* what you meant before I (or you) go to the trouble of looking them up?' This gives the questioner an opportunity to rephrase his question, to make it more precise, to use a more specific descriptor here, cut down some of the strings of ORs there, add some more descriptors, and then put the inquiry back to the computer. This time he might get the answer that there are three relevant documents. So he rephrases his inquiry again and yet again until he gets the number he requires. Then, and only then, he asks for a print-out.

I have referred above to 'a string of ORs'. This brings us to the question of inquiry logic. An inquiry can be expressed as A and B or C and D but in fact this could mean any one of three different things:

it could mean (A & B) or (C & D)
or it could mean A & (B or C) & D
or it could mean A & (B or (C & D))

We define these differences by saying that the various descriptors are on different levels of logic. This matter of levels of logic is very important. Let us take these three examples. In the first case, A & B is on the same level of logic as C & D. In the second example A, B or C, and D are on the same level of logic, and B and C are on the same, but lower, level of logic. And in this last example here A is on the same level of logic as the whole of the expression B or C & D; B is on the same level of logic as C & D, and C and D are themselves on the same, the lowest, level of logic.

Your program has to take into account the possibility of your having several levels of logic within the same inquiry. I have known examples in which up to eight levels of logic are required and I have heard of an inquiry needing forty-nine—but I think this is apocryphal. These levels of logic must somehow be indicated to the computer when your inquiry is input, either by brackets used in various ways, or by numbering the levels, like this:

A & (B OR (C & D))
A_1 & B_2 OR C_3 & D_{321}

I, myself, favour the last. Brackets are easier for the inquirer but harder for the computer, but numbering is quite easy for the inquirer (try some yourself some time and find out how easy it is) and very easy for the computer, especially with inverted filing. The flow-chart (p. 379) shows this system of numbering the levels of logic.

So far I have only mentioned AND and OR; you may also want NOT (e.g. A and B but not C). Further, you could qualify a descriptor by saying that it must be BETWEEN; for example 'at a temperature of between 1000 and 1500°C'. You may also want OUT OF: 'give me the records of all components manufactured by any four out of the following six processes'.

If you want to use BETWEEN or OUT OF in your retrieval language, then, of course, again you must be sure that your program caters for them because—and I cannot too often emphasize this—a program will only *do* what you have decided it *should do*.

Now I want to say a little about the way in which the records are organized within the computer store. There are two basic principles: they can be variable records or they can be fixed records.

Let's take item filing first. If we are using fixed records we have, as it were, dedicated a certain part of the record to a certain field—the author field, the title field, the descriptor field. We can say that the author's name is invariably to be found in words three to six of the record. (Note that this imposes an upper limit on the number of characters you can have in an author's name.) Each field has its own place dedicated to it. You can be, and some programs are, very rigid indeed about a fixed record, fixing the whole record, not merely the locations and sizes of the fields within it, by specifying the number of times each field shall occur in every record, irrespective of whether all the fields are used in any one record. You can, for instance, specify three author fields of five words each, one title field of twenty words, one citation field of twenty words and eight descriptor fields of five words each. This is going to save a lot of time in programming and a certain amount of time in executing the program; but it does mean that you will have to have thought very carefully beforehand just what you are likely to want (what about corporate authors, for example?) and what is the very maximum number of descriptors you are going to want; once you have posed an upper limit of eight you have no hope of giving nine even to a single exceptional document.

If we are using variable records we simply string the whole lot out, one field after another, preceding each field of the record with a symbol which identifies it—one symbol to say that the next string of characters is an author, one symbol for title, one for a descriptor, and so on. This means that we can have each field as long as we want. We are not stuck with an arbitrary decision made when the program was written that there shall never be more than, say, twenty-five characters to the descriptor—it could be CAT or it could be DEXTRO-RIBO-NUCLEIC-ACID!

You can have both fixed and variable fields within the same record: author, title, source, etc., can be variable records. But, for instance, you may have coded

your descriptors and given each of them, say, a four-digit numerical value. In that case you can use fixed fields for the descriptors, even though each descriptor does not have a dedicated space for itself—you cannot say definitely that the descriptor for Ribo-nucleic-acid is in word six.

You *can* use dedicated space for a descriptor where you know that it occurs very frequently—say in 90 per cent. of the records. This is unusual in documentary IR, but very common in management IR systems. And one advantage of dedicated space for a descriptor is that it helps you out of your BETWEEN problem. Imagine, for instance, an IR system on information about processes in which nearly every record contains details of the temperature at which the process is carried out. You can say that the actual temperature is recorded in word N of the record. Now, when you want process carried out between 250–500°C you can go straight to word N and compare its contents with 250–500. So fixed fields with dedicated space *can* usefully be employed in retrieval programs for certain types of job.

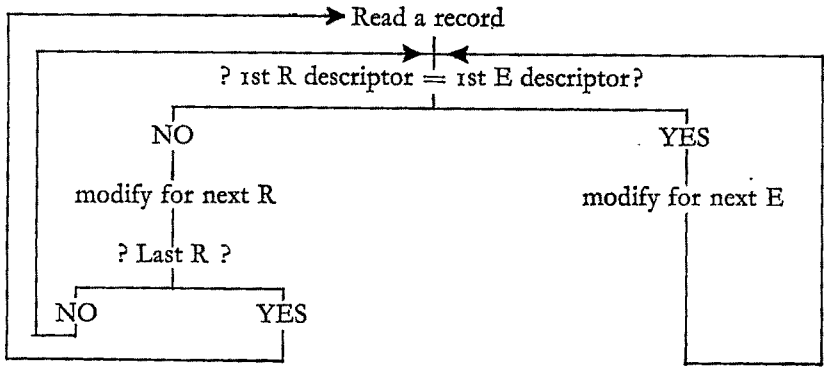
The fixed or variable, dedicated or non-dedicated, question comes up also in inverted filing. You can write out each document identity (which may be a variable record) or you can use dedicated space by allocating one character or even one bit of the record to each document, saying that the first bit represents the first document, the second the second document, and so on—there is a 1 in it if the descriptor applies to it and a nought if it does not. Since even a heavily used descriptor will not normally apply to more than about 5 per cent. at the most of the total number of documents, this *could* mean a lot of wasted space. You can, however, let the descriptor file on the backing store carry merely the relatively few document identity numbers, and convert them into the appropriate bit positions during searching. There is a paper describing this technique in Davis and Lin, 'Secondary key retrieval using an IBM 7090—1401', *Communication of the ACM,* vol. 8, no. 4, April 1965. The other way of compressing the backing store record is to put the appropriate bits into one word and then in the next word record the total number of words with no bits until the next word carries a significant bit, using the first bit of each word to show which type of data it contains, thus:

Word 1		Word 2		Word 3	
1	1	0	99	1	1
This word says that document 1 applies		This word says that the next 99 words hold zeros		This word says that document 241 applies	

In deciding what system you *should* use (item or inverted filing, fixed or variable records, dedicated or non-dedicated space) you must know—really know—what you need. You should at least be able to give a reasonable estimate of the number of descriptors per document and the number of documents per descriptor, what sort of inquiry (logic and levels), accession rate, inquiry rate, probable number of answers per question, and so on.

Now let us run fairly quickly through the quite different types of program that you require for searching item files and searching inverted files. The outline flow-chart shows an item search with some samples by which you can trace your way through step-by-step, decision-by-decision, for the two inquiries I have given as examples; but I do not want to go into this level of detail now.

Let us just consider quite simply a search for A & B–OR–C. You read your first record and you look at the first descriptor of that record to see if it is the same as the first descriptor of the inquiry—either it is or it isn't.



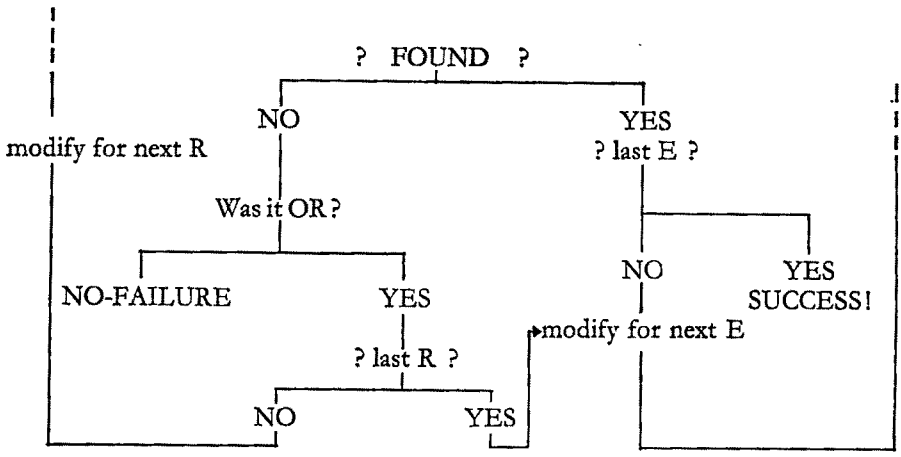
If it isn't we modify the instruction to make it say 'Is the second descriptor of the record equal to A?' and we loop back. Is the second descriptor equal to A?—no. Is the third equal to A?—no, and so on until we find a descriptor that does equal A. But then I have missed something out of this loop. I may go right through the record without finding A. So before I loop back and modify this instruction to look at the next descriptor, I have to put in another test here: 'Have I reached the end of the record descriptors?' And again two possible answers—yes or no. If no, then I can go back into my loop; if yes, then I know that I have failed this inquiry in this document and can go out of the loop to read the next document.

If I come out on the other side ('Does this document contain A?') with a YES, I now have to go back to my inquiry to find out what the next descriptor is. So we modify for the second inquiry (E) descriptor and loop back looking for B. But at the moment my flow-chart says that if I have failed to find descriptor B I have not succeeded in my search and this is wrong. My inquiry is for B *OR* C. So here I have to insert a further test: 'Was that followed by an OR?' If the answer is YES I have not failed; I go back through my loop again looking for C. Only if it was an AND would I have failed in my search.

I could go on expanding this chart a long way yet. For example, if it had been 'B NOT C' I would not have failed at this point, I would have succeeded; and if I *had* found C I would not have succeeded—I would have failed.

This is a very simple example. The example I have circulated is more complicated. It copes with the three types of logic AND, OR and NOT at any

number of levels of logic. It does not cover, as I know all the programmers among you will have seen at once, the question whether we have come to the



last descriptor in the record, or whether we have come to the last record in the file and all the usual housekeeping stuff. Nor does it cope with BETWEEN, or OUT OF.

BETWEEN we deal with either by giving dedicated space to descriptors with numerical value, or by putting a symbol after the descriptor in the document record and following it by the actual value. We put that same symbol after the descriptor in the inquiry and follow it by the two numbers which represent the range. Then, when we have found the descriptor, we test for the presence of the symbol. If the symbol is there we must test the value in the document to see whether it lies between the range specified in the inquiry. If it does, then we can come out on the 'found' side of the flow-chart. If it does not, then we come out on the 'not found' side.

OUT OF is a little more complicated. The inquiry must carry the words OUT OF followed by the number which must be found, e.g. if it is 4 out of 8 it will read OUT OF, 4, followed by the eight descriptors in question.

During the search program, as soon as the 'OUT OF' is found a counter holding (in this case)4 must be set up—each one of the descriptors is then sought in turn and 1 is subtracted from the count when one of them is found. As soon as the count = zero, we can come out on the 'FOUND' side of the flow-chart and forget about the remaining descriptors; if after all the descriptors specified have been examined the count is still not down to zero, we come out on the 'NOT FOUND' side. So much for serial filing.

An inverted search needs in the first place a program to convert the input, which is just a document description plus its descriptors, into the inverted form, and to store the document reference data on its random access store; this is a job which needs careful programming.

The search program itself is relatively straightforward. You need a working field as long as you can conveniently manage, plus a field of the same length for

every level of logic in the inquiry. As an example, let us take the simple inquiry:

A and (B or (C and D))

which we can write as

A1 & B2 OR C3 & D321

We read the record of our first descriptor, A, into the working area. We note it is a 1st-level inquiry so put it with its following logic into the field for the 1st-level, and read the next descriptor's record (B) into the working area:

working area	2	OR	B
level-1 area		&	A

But B is on a level whose field is still empty, being a 2nd-level descriptor; so we put it into the 2nd-level field and read the next descriptor. This is a 3rd-level; we have no 3rd-levels at the moment, so we put it into the 3rd-level field, and bring down the next descriptor into the working area. We now have the position:

working area	3		D
level-1 area		&	A
level-2 area		OR	B
level-3 area		&	C

Now we have a record in the working area which is on the same level as one of the fields we have previously filled, so we know we have got to do something about it. These two fields are joined by an AND—it says so, here in this level-3 field. So we do a logical AND between them, leaving in the level-3 area the result of (C–&–D) and leaving the working area empty. Our store now looks like this:

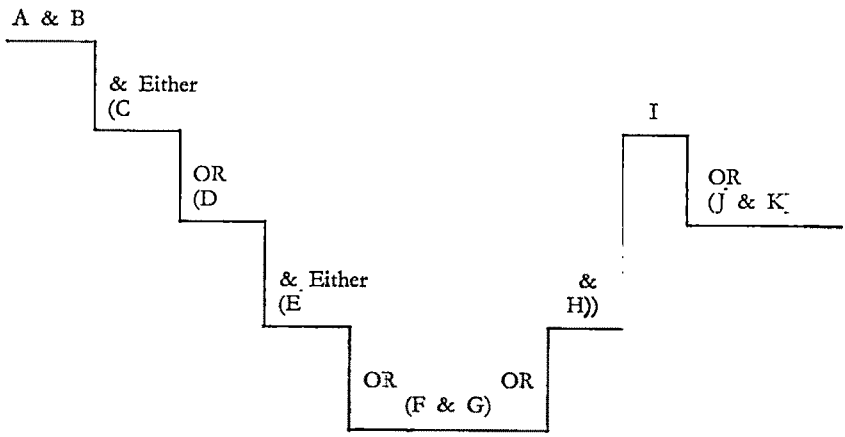
working area			empty
level-1 area		&	(A)
level-2 area		OR	(B)
level-3 area		&	('C–&–D')

We now read the next inquiry descriptor—there is none, so we know that we have come to the end. Now we have to start working our way up to the levels. We know that what is in the level-3 area can now be compared with the contents of level-2. Level-2 is joined to what follows it by an OR, so we do a logical OR between the level-3 field and the level-2 field, leaving in the level-2 field B OR C–&–D, and we zeroize level-3.

working area		empty
level-1 area	&	A
level-2 area	OR	B or C–&–D
level-3 area		empty

We know now that what is in level-2 area can be compared with level-1. The level-1 field is joined to what follows it by an AND, so we do a logical AND between the two fields, leaving the result in level-1 field and zeroizing level-2. All fields except level-1 are empty by now so this is the final answer.

Now this was a simple example, but you can use the same principle when your inquiry varies between levels like this:



When the descriptor coming into the working area (e.g. I in this case) is of a higher level than some of your lower level fields, you must deal with these fields until they are empty, then carry on with the newly read descriptor in the working area except when you jump up two levels, as with I: in that case you must store the current contents of level-2 until you reach it again. Once we have the final answer in level-1 area, we can type out the fact that we have N answers, asking if this is enough; or output the details. The 1-bits can be converted back into document numbers and these numbers printed; or they can generate the random access store address from which details of the documents can be extracted and printed.

BETWEEN is no real problem in an inverted system; where a descriptor has a numerical value you allocate to each document enough bits to hold this value; if, say, the maximum is 100 you will have to leave 7 bits for each document. When bringing the descriptor down into the working area, you must examine

each 7-bit group, comparing it with the limits given in the inquiry. Only if it comes within the permitted range do you enter a 1-bit in the appropriate position of the working field.

OUT OF is much more of a problem. You have to get the computer to work out all the possible permutations; then you have to get the descriptors for each permutation in turn and AND them all together, storing separately the result for each permutation. When you have done all the permutations, you must 'OR' all their results. Then you can put the result of all that into the area for the level concerned and carry on with your search. In fact, probability of frequent OUT OFs in the inquiries is a good reason for not choosing inverted filing.

Links, roles and weighting can all be accommodated in either type of program. There are lots of other little techniques and dodges for saving space and/or time—but I have not saved enough time to mention them. And most of them will, I'm sure, spring to the minds of the programmers here, without prompting from me.

Up until now I have been talking about search systems which use a formal descriptor language. But there is one further kind of search in documentary retrieval which is becoming known in the jargon as 'free language searching'. I have had no experience of this sort of searching and all I can say about it is theoretical and must not be taken as gospel. But I cannot leave the subject without at least mentioning it. In free language searching you just input a complete hunk of actual plain language text, and you frame your inquiry also in an uncontrolled language. Your search program is similar to an item search, using the usual logical relationships, but one computer manufacturer has added a new logical relation, WITH. This is because in a long piece of text two of the required words may occur, one at one end in one context and the other at the other in a quite different context; so they use WITH as a sort of super-AND meaning 'I want both these descriptors in the same sentence'.

Free language search saves a lot of trouble at the input end—no indexing, no special preparation of input material, no bother with looking up your inquiry words in a thesaurus, though, of course, you have got a lot more ORs. I imagine it complicates the program quite a bit, but, as I say, I have no personal experience.

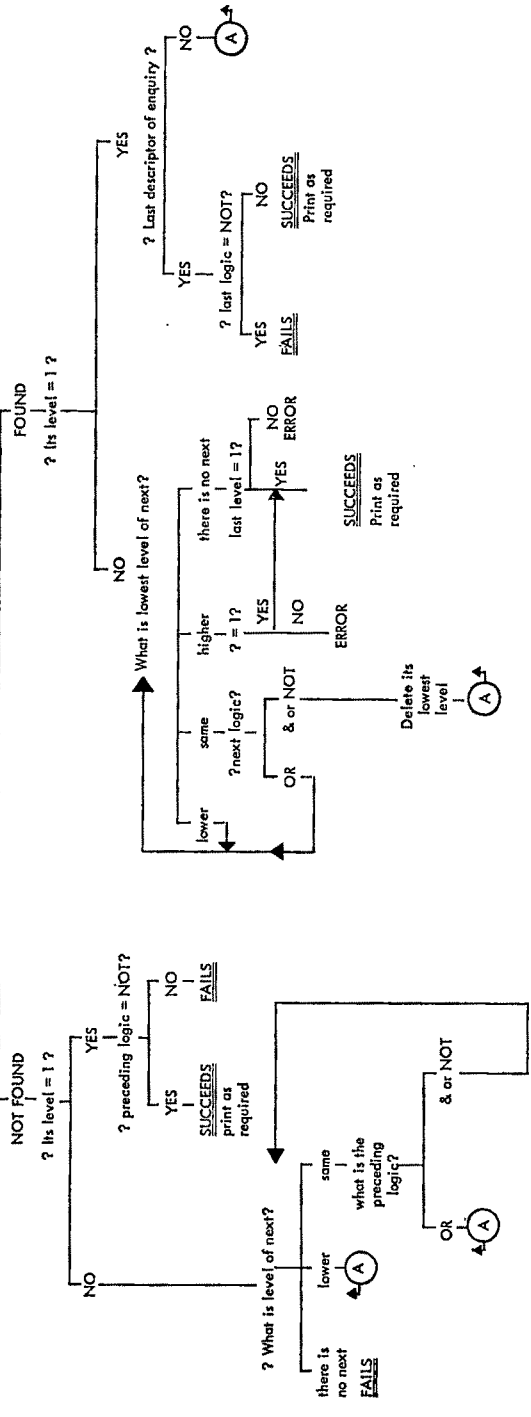
Until quite recently I have held fairly strongly to the opinion that because of the uncontrolled language there was little future in free language searching. But I have recently been told by someone whose opinion I respect and who did once share my opinion, that from his own experience he no longer does so. So perhaps free language searching is coming into its own.

My time is running out, but I am down on the programme to say something about the manual work involved. Let no one underestimate this. Apart from free-language systems you have an indexing problem greater than any you will have with a conventional library system, because if you are to take advantage of the computer you will want deeper indexing than hitherto—and the indexing *must be good,* because the most sophisticated search program is not going to get the right answers if the foundations (the retrieval language and the way it is used) are unsound.

Then you have to get the information into the computer—and only those who

have slaved at creating punching documents know just what a job this is. A punch operator is chosen for no other quality than high manual dexterity. She does not 'read' what she is punching in the sense of comprehending it—there is virtually a reflex action between her eyes and her fingers. So you have to be very careful in the way you lay out the material to be punched so that the right fields are input in the right places. You even have to learn a new script (though this is not much and you soon get used to it) to distinguish between zero and an 'o', between a 1 and an I, a 2 and a Z. The operator is punching so fast she is not going to see them in their context. They are just a string of characters to her—they don't have a context. In addition to all this you have to add the appropriate symbols—e.g. a '1' in col. 80 if this card holds an author's name. You have to allocate serial numbers to the cards, for the computer to check that it is getting the right information in the right sequence; if you are working in variable field lengths you have to include the symbols for each field; if your output is to be in upper and lower case you have to put in the symbols to indicate which is which, and so on. Preparation of input is not a task for your most junior clerk; it requires meticulous accuracy and an understanding of the requirements of the program.

I have tried to give you an idea of the types of programs which can be used. You may find that you need to have a program specially written to meet your own special requirements. But increasingly in all fields of computer applications the computer manufacturers are getting their systems analysts to define the features common to a large number of requirements in a given application and are then writing the so-called 'package programs' which will meet the majority of needs of the majority of users.



OUTLINE FLOW-CHART FOR ITEM SEARCH WITH LEVELS SHOWN NUMERICALLY

e.g. A & B & (C OR (D & E) OR (F & G)) = A_1 & B_1 & C_2 OR D_3 & E_{32} OR F_3 & G_{321}

A OR (C NOT D) = A_1 OR C_2 NOT D_{21}

ENQUIRY A1 & B1 & C2 OR D3 & E32 OR F1 & G321

Doc. holds

A, B, C A found; level=1; not end; next logic &; seek B; B found; level=1; not end; next logic &; seek C; C found; level=1; next level (D3) lower; next level (E32) same; next logic OR; next level (F3) lower; next level (G321) lower; no next level; last level=1. FOUND

A, B, D, E A found; level=1; not end; next logic B; seek B; B found; level=1; not end; next logic &; seek C; C not found; level=1; next level (D3) lower; seek D; D found; D's level=1; next level (E32) same; next logic &; reduce E32 to E2; seek E; E found; next level (F3) lower; next level (G321) lower; no next level; last level=1. FOUND.

A, G A found; level=1; not end; next logic &; seek B; not found; level=1. FAILS

ENQUIRY A1 OR C2 NOT D21

A, C A found; level=1; not end; next logic OR; seek C; C found; level≠1; next level (D21) same; next logic NOT; reduce level of D21 to D1; seek D; not found; level=1; end; preceding logic NOT. SUCCEEDS

A, C, D A found; level=1; not end; next logic OR; seek C; C found; level≠1; next level (D21) same; next logic NOT; reduce level of D21 to D1; seek D; D found; level=1; end; last logic NOT. FAILS

```
A & B
    & (C                                    & (I
        OR (D                                   OR (J & K))
            & (E                 OR H))
                OR (F & G)
```

A1 & B1 & C2 OR D3 & E4 OR F5 & G5 OR H4 & I2 OR J3 & K3

READ:—	LOGIC	RESULT	TEST
A →WA→1			
B →WA	& WA/1	1 holds A & B	If 1 logic = &, FAIL if 1 is empty.
C →WA→2			
D →WA→3			
E →WA→4			
F →WA→5			
G →WA	& WA/5	5 holds (F & G)	
H→WA	OR 5/4	4 holds E OR (F & G)	
	OR WA/4	4 holds E OR (F & G) OR H	
I →WA	& 4/3	3 holds D.....H	
	OR 3/2	2 holds C.....H	If 2 logic = &, store if not empty don't store if empty.
WA→2			
J →WA→3			
K→WA	& WA/3	3 holds J & K	
	OR 3/2	2 holds I or J & K	If 2 empty go to (Σ); if not go to (Z).
nothing→WA		(X)	If store empty, store—WA go to (Y). If store empty FAIL.
(Y)	& WA/2	2 holds C....K	
(Z)	& 2/1	1 holds A....K=answer	

WA = Working Area.

→ = moved into.

1, 2, etc. = Level 1, 2, etc., area.

& WA/5 = Do a logical AND between Working Area and Level 1 area.

USE OF PACKAGE PROGRAMS FOR INFORMATION PROCESSING

E. MASSEY

International Computers and Tabulators

THE main aspects of Information Processing are collection, file creation (including indexing), analysis, retrieval, presentation and dissemination. The term 'Information retrieval' is too frequently used in lieu of 'information processing" and I believe that one of the major dangers in designing an information processing system is that by calling it an information retrieval system the design can be implicitly motivated to concentrate on the narrower aspects of retrieval at the expense of the broad issues of what information needs to be collected and filed and why and how it should be processed.

There is no doubt that the main features of a computer system which are of value to a library and indeed any business organization are the computer's ability to store vast quantities of data for virtually an infinite period of time and its ability to process, manipulate and analyse in one week the same volume of data as would occupy the working life of a clerk armed with only manual procedures. There is equally no doubt that this very potential of the computer system may mask the fact that there is a major question of cost involved in using this potential for solutions to information processing problems—costs which can be measured in terms of money, time and purpose.

I refer to the design of systems and I believe that design is the operative word and the application of the disciplines of design are at least as important in this field as they are in any of the more obviously organized design processes.

There is a very ready comparison of the problems of designing a road bridge and that of designing an information processing system. Both are concerned with the handling of traffic flows. In the former case the designer has to achieve a structure which will cater for both the physical characteristics and the volume of the vehicular traffic which are anticipated during the life span of the bridge; equally once he has ensured that the safety tolerances will be met he has an economic motivation not to over-design.

There are identical problems in the case of the design of the information processing system; unfortunately man's present knowledge of information flow is considerably less than his knowledge of traffic flow and the design parameters are much more difficult to specify; indeed there are basic difficulties confronting the information processing systems designer. Let us examine what steps are being taken by computer manufacturers, consultant and other central authorities to assist the finding of solutions to overcome these difficulties.

There are three major steps in designing an information processing system

(of course these steps exist for any type of computer application).

The first step is to define the problem to which a solution is being sought.

The second step is to translate the problem from terms and characteristics comprehensible to man, but almost certainly not to a machine, into a form which can be applied to the machine for the solution process. The output of this step is a logical series of operations, quantifiable wherever possible and is diagrammatically represented by a procedure known as flow-charting.

The third step is that of writing the programs to enable the computer to discharge the many facets of processing which may be concerned.

Of course, there are overlapping areas between these steps, and indeed ten years ago the steps were regarded only as a whole, unfortunately frequently an amorphous whole. However, experience has enabled crystallization and this crystallization is an essential prerequisite to solution. With the growth of crystallization the systems analyst has come into prominence; his sphere of influence straddles all three steps with his key role being played in the middle step.

Like any other designer, the systems analyst's task is made easier by the provision of appropriate 'tools' and the development of these tools has become the responsibility of the computer manufacturers, and to a lesser, but, nevertheless, increasing, extent by other central organizations.

The tools available to the programmer include the various programmers' languages, COBOL, FORTRAN, etc., and also programs, routines and subroutines written for specific functions by computer manufacturers for their relevant ranges of machines.

Of more interest to this meeting are those tools which have been developed, or are being developed, for use at the first and second steps. These tools are packaged programs, themselves developed by this three-step design process and which assist the system analyst to define his problems and to build logical models pertinent to that definition.

Packaged programs in this category include indexing and classifying techniques, simulation languages and certain operations research systems.

Let us examine two packages in more detail—first NIC—Nineteen hundred Indexing and Cataloguing. This is a retrospective and a current awareness program and is of immense value as an information processing learning tool.

In this role it should be used as early as possible in the overall design process. In addition to its obvious use for indexing and cataloguing technical literature it can be used for similar purposes for chemical compounds and geological specimens. It is also of value for producing organizational listings in terms of hierarchy structure, functional responsibilities and telephone directories as well as their inter-relationships.

FIND is a system for the selective retrieval of information from magnetic tape based on predetermined criteria entered by parameters punched into cards or paper tape. In other words, it performs retrieval, not by key, but by content.

FIND does not stop at retrieval. It has very powerful output facilities, giving the user the option of:

(*a*) writing the retrieved information (all, part or any combination of it) to magnetic tape subfiles.

(*b*) presenting this information on the line printer as listings, headed and edited as the user wishes.

Hence FIND is either a total retrieval system in itself, or else an open-ended module for incorporation into a wider information processing scheme.

How then can this technique help the systems analyst, or the manager or administrator who has to cope with the ever-increasing demand for returns. statistics, reports and just plain simple answers?

I am not attempting to deal with all the problems with which they have to deal. But I am probably on safe ground in saying that these fall into two categories: recurrent problems, meaning the regular reports that have to be made, and *ad hoc* problems, meaning the one-off inquiries reaching them out of the blue. The latter invariably demand the massive searching of files of all types, by the personnel, stock or accounting files, etc., and such files are likely to relate, not only to current, but also to historical activities.

Manual searching is obviously a time-consuming and, quite possibly, inaccurate process. Computer searching would, of course, be the answer, but one is faced with the high cost of programming a search to deal with each recurrent problem, and the sheer impracticability of writing a special-purpose program for every *ad hoc* inquiry.

This is where FIND comes in, because it is a general-purpose package that can handle these problems at computer speeds, but without programming cost.

How does FIND achieve this? Before discussing in detail the FIND method, we must first consider the exact nature of each inquiry that FIND is going to handle. In simple words, this means deciphering it and expressing it in more precise terms. Let us consider, for example, the following inquiry, expressed in the natural language in which it might be received:

'There are vacancies for senior secretaries in London and Manchester. Have we anyone on the staff who could fill these vacancies?'

This appears to be a simple and straightforward inquiry, but very much more information is needed before the computer can handle it, e.g. What are the qualifications for senior secretaries? It may be that they should have typing speeds of more than forty words per minute and shorthand speeds in excess of eighty words per minute. Furthermore, it is considered that only staff currently working in London or Manchester would be interested in the vacancies. What else do we want to know about the suitable candidates? Just their names and qualifications, or all details available? In fact, the whole inquiry can be rephrased as follows:

'Select and print from the file details of all staff in London or Manchester who have typing speeds of more than forty words per minute, and shorthand speeds of more than eighty words per minute.'

If the FIND system is to be asked to interrogate a file on the basis of certain criteria, it must be told where, in each record, it will find these criteria. This process is known as 'file definition', and consists of giving an eight-character name to each field to be searched, stating the length of the field and its starting position in the record. e.g. LOCATION TYPING SHORT. Together, a set of file definitions comprise what is known as the 'Dictionary'. Obviously, once a file is defined, either in total or in part, the dictionary can be used time and

again, provided the file format is not changed. Files are standard 1900 files. No special design is needed. (Fixed formats or fields being interrogated.) The inquiry must now be expressed in the logical language required by FIND. This language consists of two logical operations, AND and OR and six relations:

equal to (EQL)
greater than (GTR)
less than (LSS)
not equal to (NEQ)
greater than or equal to (GEQ)
less than or equal to (LEQ)

AND/OR: The significance of AND is that *all* conditions governed by it must be satisfied (e.g. to meet a certain requirement we must have A AND B AND C).

With an OR operator, *any one* of the conditions must be satisfied (e.g. we must have A OR B OR C). AND and OR may be mixed (e.g. we must have A AND B OR C).

Quantitative Relations: these are self explanatory, and are used to define the relationship between a field and a specified constant (e.g. we are interested in field A (a year) if it is greater than 1960).

We are interested in field C (a name) if it equals JONES.

To see how these operators and relations are used, we can revert to our initial example, which we have rephrased as:

'Select and print from the file details of staff in London or Manchester who have typing speeds of more than forty words per minute, and shorthand speeds of more than eighty words per minute.'

This is now further reduced by introducing the field names LOCATION, TYPING and SHORT which we have already defined in the dictionary, and also any coding peculiar to the file (in this case London = 26 and Manchester = 30). The necessary logical operators and relations are also introduced, so that the inquiry now reads:

'List staff in LOCATION EQUAL TO 26 OR LOCATION EQUAL TO 30 AND with TYPING GREATER THAN 40 AND SHORT GREATER THAN 80.'

The inquiry is now almost in its FIND format. It remains to arrange the operators in conjunction with open and close brackets to denote their spheres of influence, and to write the relations in their shortened form:

'AND (OR (LOCATION EQL 26 LOCATION EQL30) TYPING GTR 40 SHORT GTR 80).'

This process is followed for each inquiry. Up to twenty-four inquiries may be handled at any one time. Finally, the output required must be defined Here, two main options are available to the FIND user. Either the records satisfying the inquiries, or any part or combination of the records, may be written to sub-files, or they may be printed out in the form of lists, with sub-totals and totals as required.

Alternatively, it may not be necessary to know the contents of records satisfying inquiries, but merely the number of records. In this case, it is possible, when specifying the inquiry, to ask for a COUNT only and a count will be printed without the necessity of entering any of the output options.

This may seem a tedious business, but remember that for regular jobs this is a once-only performance. Once the parameters for any job have been made out, they are good for any number of subsequent runs. For *ad hoc* inquiries the specification of parameters is a much quicker job than searching through files manually for the answers, and very much simpler than writing a special purpose program to run the job on the computer. With a little practice, inquiries can be expressed directly in FIND language.

All these parameters—the dictionary, the inquiry sets, the sub-file sets or the tabulation sets—are then punched into cards or paper tape. The sequence of events on the computer is now as follows:

1. The FIND program which is held on magnetic tape is read into the computer store.
2. The computer then reads the dictionary and stores it.
3. It then reads the inquiry sets and compiles these into an inquiry program.
4. It then examines each record in turn from the master file against the inquiry program.
5. Each time the computer discovers a match between a record and an inquiry the record is written out to a hit file.

At the same time a 24-bit word is attached to the record with a bit set in the notational position corresponding to the number of the inquiry which has been satisfied by that record. If a record satisfies more than one inquiry it is not written out to the hit file again but merely another bit is set in the hit word position appropriate to the number of the inquiry.

The computer then reads the output parameters and according to the users' requirements it creates sub-files from the hit file which are then available for further processing, or alternatively the hit file or any part or combination of the records on the hit file can be output on the line printer in the form of tabulation with sub-totals or totals on specified fields.

The FIND system is written in 4 modules or runs.

Run 1 formulates the inquiry program.

Run 2 interrogates the master file using the inquiry program and creates the hit-file.

Run 3 provides the facilities for producing edited sub-files from the hit-file.

Run 4 provides the facilities for printing the extracted information from the hit-file in any desired format and of producing totals.

To enable the system to operate the user must supply information regarding the files, the inquiries and the output required. This information is presented in the form of parameters input on cards or paper-tape.

Summarizing, the user is advised of the difficulties inherent in the design of an overall information processing system; the greatest of these difficulties is getting the correct balance between cost and potential achievement. The user is also advised as to the value of the many and varied packaged programs available which he can use either as tools to assist his design or as component parts of his final solution to that design.

SUMMARY OF DISCUSSION

It was clear from a show of hands that very few of the audience expected to have the use of a computer for IR during 'the next few years'. To that extent the teach-in could be considered timely; at least it did not lag behind the need. It was not wholly surprising, therefore, that many questions were aimed at classification of some necessarily brief remark or of elucidating detail.

Questions relating to the 'optimum semantic basis' outnumbered questions about 'optimum file arrangement' by at least two to one. This might be attributed to (a) constructive curiosity on the part of systems analysts or (b) divided opinion amongst documentalists! The answers provided may assist both sides to adopt somewhat narrower feasibility brackets, and hence give themselves few variants for study.

'Free-text' searching came in for close questioning and, naturally, the Nottingham experience was eagerly sought. On the narrow score of visible relevance the experience on 'title only' was not encouraging; on the other hand it was pleasing to hear that CBAC (where carefully prepared digests are searched) is capable of giving high satisfaction. Questions tended to indicate that inquirers 'believed' in *either* pre-search indexing (or classification) *or* in at-search specification of needs (i.e. indexing the questions). Ensuing discussion opened the mind to the thought that the techniques were not necessarily competitive; they might be valuably complementary.

Several questioners wanted much more detail on the running of SDI services. This might indicate that, in British documentation circles, if not computer circles, we have been much concerned with the principles of *selection,* but possibly less concerned with the processes of *provision.* Other questions having similar motivation concerned 'weeding' and size of text-bearing collection at which computerisation was warranted.

Perhaps the state of opinion was best expressed by the questioner who reminded us that the long-term objective for all of us was to minimise the 'total indexing load' (i.e. at input *and* output). Undoubtedly he was right; when the documentalists are in more agreement about this they will be able to call much more loudly to the systems analysts.

In the meantime, neither side can pursue a wholly solitary course. Each must convene regularly with the other. This teach-in had no more ambitious objective than to initiate the conversation on a professionally communal basis.

Letters to the Editor

Dear Sir,

Before reading Mr Jolley's paper on co-ordinate indexing, I certainly believed that to know more, about anything, is indeed pleasant. Now I am not so sure.

There are occasions when complex language is essential; we do not need lectures geared to child level. Nevertheless, the subject of co-ordinate indexing seems to be increasingly bogged down by esoteric jargon which, although it adds to the mystique, also renders extremely obscure the processes it describes. The essence of successful communication is lucidity. How many Aslib members could *honestly* say that they fully absorb the kind of language used by Mr Jolley, and, further, to how many is what he describes of practical use?

If the application of logic in this field involves the use of terms like holotheme, semantic continuum, integrative levels, transitivity, symmetry and reflexiveness, with a seasoning of vector analysis and embellishments of subcodes representing more subcodes, might we not do better without such an application? Much more of this heady stuff, and we shall become merely academic theoreticians, like some clerics who spend so much time discussing theological dogma that they have no time to put religion into practice.

Yours faithfully,

MISS V. LEWIS

Technical Library,
Lloyd's Register of Shipping,
71 Fenchurch Street,
London, EC3.
4th October 1967

Mr Jolley has asked us to publish the following reply:

Dear Miss Lewis,

Your letter is like Rosie's remark to Sam Gamgee at the end of 'The Lord of the Rings'—it needs a week's answer, or none. I'm afraid I can't give either type of response; but here is the best I can manage.

To start with, let's establish a point of agreement. I gather you disapprove of esoteric jargon in the field of co-ordinate indexing: so do I. That is why, instead of employing it, I used the standard and widely known words of logic and set theory. Commutation, symmetry, transitivity, reflexiveness and the like appear in the school mathematics syllabus, and indeed I checked the accuracy of my paper by reading my fourteen-year-old daughter's well-thumbed third-form textbook. My object was not to make things obscure but to show general principles. (I admit I invented the word 'holotheme', but I hunted high and low first, and couldn't find any existing word that carried the meaning I wanted to talk about.)

To find general principles is an aim of all theory, and I don't think any discipline, large or small, can endure without it. Many members of the Co-ordinate Indexing Group are qualified in major sciences, such as chemistry or architecture, where the practical side came first—in the Middle Ages or before—and eventually called on the theoretical side to join it. The theory, in fact, turned out to be needed; and in those subjects it is considerably more abstruse and specialized than is the little logic I presented in my paper.

Of course, to offer this sort of thing to a novice would be unwise; but the Co-ordinate Indexing Group is the senior body in its subject in documentation, and can (or at least I hope it can) take it. I hope, too, it can find something useful there; at any rate, I tried to be helpful and practical, showing how to use check cards, how false drops or crossovers occur, how links and roles are used, and how co-ordinate indexing appears to those who do not use it for subject matter. These, indeed, are the majority—there are far more co-ordinate indexers outside the field of documentation than within it.

May I conclude by taking up one other point? You are kind enough to call my paper 'heady stuff', with all that phrase implies of excitement, sparkle and attractiveness. It would be nice to believe you; but I doubt it!

Yours sincerely,
J. L. JOLLEY

SELECTIONS FROM THE RECENT LITERATURE

ALL ITEMS listed may be borrowed from the Aslib Library, except those marked *, which may be consulted in the Library.

Books and Pamphlets

ABERYSTWYTH. College of Librarianship. *Library Research and Information Department*
Education for librarianship: an outline list of materials [by Philip R. D. Corrigan]. 2nd ed. Aberystwyth, the College, 1967. [49] p.

BOOZ ALLEN RESEARCH, INC.
Mechanization study of the Technical Information Reference Branch of the Systems Engineering Group, Wright-Patterson Air Force Base, Ohio, by G. A. Kershaw and others. Bethesda, Md., the Company, 1966. 26 p. illus., diagrs. (AD 489 999)

*BRITISH CERAMIC RESEARCH ASSOCIATION
List of English words used in ceramic technology. Stoke-on-Trent, the Association, 1967.

*BRITISH COMPUTER SOCIETY *and* NATIONAL COMPUTING CENTRE
Computer courses, 1967. London, British Computer Society, 1967. 29 p. tables. 7*s* 6*d*.

BRITISH STANDARDS INSTITUTION
Specification for artificial daylight for the assessment of colour. Part 2: viewing conditions for the graphic arts industry. London, the Association, 1967. 10 p. tables. (B.S. 950: 1967).

CARROLL, JOHN M.
Syllabus of a course in file management. Bethlehem, Pa., Lehigh University, 1967. 17 p. (Lehigh University, Center for the Information Sciences. Curriculum for the Information Sciences, report no. 9.)

CHONEZ, NICOLE
Système de dissémination sélective experimenté en 1967 au service central de documentation du C.E.A., à Saclay. Saclay, Commissariat à l'Energie Atomique, Centre d'Etudes Nucléaires de Saclay, 1967. 42. [5] p. tables, diagrs.

CORRIGAN, PHILIP R. D.
An introduction to Sears' list of subject headings. London, Clive Bingley, 1967. 94 p. (A programmed text in library and information science: series ed., C. D. Batty.) 21*s*

*DIRECTORY of British associations, 1967–8. 2nd ed. Beckenham, CBD Research Ltd, x, 293 p. 80*s*.

DOYLE, LAUREN B.
Perpetual user studies: a prerequisite for management of information on a national scale. Santa Monica, Calif. System Development Corporation, 1966. 15 p.

EUROPEAN COMPUTER MANUFACTURERS ASSOCIATION
ECMA standard for the alphanumeric character set OCR-B for optical recognition. Geneva, ECMA, 1965. [2], 12 [185] p. illus., tables. (ECMA-11.)

EVANS, A. J., *and* WALL, R. A.
Periodicals data automation project—preliminary report. Loughborough, Leics., Loughborough University of Technology, 1967. 24 p. illus., diagrs.

*FEDERATION INTERNATIONALE DE DOCUMENTATION
Cumulated U.D.C. supplements (–1964). The Hague, F.I.D., 1967. 6 vols. (FID 420). vol. 1: 0/3. vol. 2: 5/61. vol. 3: 62/621. vol. 4: 622/65. vol. 5: 66/68. vol. 6: 69/9 +aux. Includes for relevant UDC classes all amendments published in the 'Ergäuzungen' to the Germal full edition (up to p. 410) and the 'Extensions and corrections to the UDC' up to December 1964, with corrections in later P notes up to p. 835.

*FEDERATION INTERNATIONALE DE DOCUMENTATION
Directories of science information sources: international bibliography. 2nd ed. The Hague, F.I.D., 1967. 163 p. (FID Publication no. 421.) 30 G.

FOSKETT, A. C.
A guide to personal indexes using edge-notched and peek-a-boo cards. London, Clive Bingley, 1967. 80 p. tables, diagrs. 18*s*.

GRAHAM, WARREN R.
Exploration of oral/informal technical communications behaviour: semi-annual technical report. Silver Springs, Md., American Institutes for Research, 1967. [61, vii] p. tables. (AD 650 219).

*GREAT BRITAIN. Stationery Office
Consolidated index to government publications. London, H.M.S.O., 1967. iii, 129 p. 14*s*.

HERTFORDSHIRE COUNTY COUNCIL. Technical Information Service.
Computer applications: a select bibliography compiled by Colin I. Barnes. Hatfield, the Service. [1967]. 66, vi p. 5*s*.

INTERNATIONAL BUSINESS MACHINES. Data Processing Division. *Systems Reference Library*
Catalog of programs for IBM 1240–1401–1420–1440 and 1460 Data Processing Systems. New York, I.B.M., 1967. xvii, 75 p.

LOWE, T. C.
Design principles for an on-line information retrieval system. Philadelphia, Pa., Pennsylvania University, 1966. 136 p. diagrs. (AD 647 196).

MARCHLEWSKA, JADWIGA
Monografie: character, typy, zakres, wskazówki dla autorów. [Monographs: character, type, scope, directions for authors.] Warsaw, Central Institute for Scientific Information. [1966]. 102 p. photos, tables, illus., diagrs. Contains a multi-lingual glossary, p. 92.

RIDER, K. J.
The history of science and technology: a select bibliography for students. London, Library Association, 1967. 60 p. (Special Subject List, no. 8.) 15*s*.

SASTRI, MADAGULA I.
A linguistic approach to relevance judgment. Cleveland, Ohio, Western Reserve University, Center for Documentation and Communication Research, 1967. 14 p. (Comparative Systems Laboratory, Technical report, no. 12.)

*SAUR, KLAUS GERHARD
Internationales Verlagsadressbuch [Publishers' international directory]. 3rd ed. München, Verlag Dokumentation, 1967. xxxii, 764 p.

TEXAS CONFERENCE ON LIBRARY MECHANIZATION, 1st, Austin, Texas, March 23–4, 1966
Proceedings, edited by John B. Corbin. Austin Texas Library and Historical Commission, 1966. 47 p. (Texas Library and Historical Commission Monograph, no. 6).

*THOMPSON, J. WALTER, COMPANY
General subject headings used in the JWT—Chicago library [compiled by Elin B. Christianson, Librarian]. Chicago, Ill., the Company, 1965. ii, 43 p.

*TSOUNIS, T. *comp.*
Scientific and technical documentation and information centres, research and economic development organisations: an international guide. Athens, Greek Productivity Centre, 1966. 491 p.

*ULRICH'S international periodical directory: a classified guide to a select list of current periodicals, foreign and domestic. 12th ed., edited by Marietta Chicorel. New York, R. R. Bowker, 1967. 2 vol. vol. 1: science, technology and medicine.

*WILLIAMS, B. J. S.
Evaluation of microrecording techniques for information and data storage and retrieval. [Hatfield, Herts.], Hertis, 1967. vi, 104 p. tables, diagrs.

Articles and Papers

AMPEX Videofile System
Office Machine Equipment, no.58, September 1967, p.15–9.

BLANKENSTEIN, GERD
Die hierarchische Struktur eines Thesaurus und die Eindeutigkeit der Deskriptoren. [The hierarchical order of a thesaurus and the unambiguity of descriptors.] *ZIID—Zeitschrift*, vol.14, no.4, 1967. p.110–5.

BUIST, ELEANOR
Soviet centralised cataloging: a view from abroad. *Library Trends*, vol.16, no.1, July 1967, p.127–42.

CAIN, ALEXANDER M.
Steps toward a computer based library network: a survey of three medical libraries. *Bulletin of the Medical Library Association*, vol.55, no.3, July 1967, p.279–89.

CLAPP, VERNER W.
Retrospect and prospect. *Library Trends*, vol.16, no.21, July 1967, p.165–75.

COLE, PETER F., *and* BROCKIS, J.
How much information work? *New Scientist*, vol.36, no.565, October 1967, p.36.

COWARD, R. E.
A new look in national bibliographies: some implications of the use of computers with special reference to the "Deutsche Bibliographie". *Library Association Record*, vol.69, no.9, September 1967, p.310–3.

CRANEFIELD, PAUL F.
Retrieving the irretrievable: or the editor, the author and the machine. *Bulletin of the Medical Library Association*, vol.55, no.2, April 1967, p.129–34.

CRONIN, JOHN W., *et al.*
Centralized cataloguing at the national and international level. *Library Resources and Technical Services*, vol.11, no.1, Winter 1967, p.27–50. A collection of articles by John W. Cronin, John M. Dawson, William S. Dix, and James E. Skipper.

DAWSON, JOHN M.
The Library of Congress: its role in co-operative and centralised cataloguing. *Library Trends*, vol.16, no.1, July 1967, p.85–96.

DIRECTORY of special and technical libraries. *Leabharlann,* vol.25, no.3, September 1967, pp.119, 121–3, 125–7, 129, 131–2.

EROSION by computer: U.S. publishers resist inroads on copyright. *Bookseller,* no.3219, 2 September, 1967, p.1572–6.

FOCK, JOHANNES
Das Lochkartenverfahren in der Leihstelle der Staats- und Universitätsbibliothek Hamburg. [Procedures with punched cards in the loans departments of the State and University Library of Hamburg.] *Zeitschrift für Bibliothekswesen und Bibliographie,* vol.14, no.3, 1967, p.143–53.

FODDER, H. E. W., *and* MCGARRY, K. J.
The Library Association's examinations in the bibliography and librarianship of education: some thoughts and approaches. *Education Libraries Bulletin* no.29, Summer 1967, p.1–11.

GARFIELD, EUGENE, *and* SHER, IRVING, H.
ISI's experiences with ASCA—selective dissemination system. *Journal of Chemical Documentation,* vol.7, no.3, August 1967, p.147–53.

GRANT, BRYAN
Computer charging—an appraisal. *Assistant Librarian,* vol.60, no.9, September 1967, p.186–8.

HAVARD-WILLIAMS, P.
The Parry report. *Library Association Record,* vol.69, no.9, September 1967, p.299–303.

HOLZBAUER, HERBERT
Inhouse ADP training. *Special Libraries,* vol.58, no.6, July-August 1967, p.427–8.

HOPKINS, K.
Commercial information. *Northern Aslib Bulletin,* vol.12, no.2, April/June 1967, p.10–4.

HORVATH, PAUL J., *and others*
The B.F.Goodrich information retrieval system and automatic distribution using computer-compiled thesaurus and dual dictionary. *Journal of Chemical Documentation,* vol.7, no.3, August 1967, p.124–30.

JAHODA, GERALD
Planning improved library service for scientists in universities. *College and Research Libraries,* vol.28, no.5, September 1967, p.343–6.

JOVANOVICH, WILLIAM
Information as a property. *Wilson Library Bulletin,* vol.42, no.1, September 1967, p.46–55.

KABRT, GEORGE
Public libraries in Czechoslovakia. *Library World,* vol.69, no.807, September 1967, p.62–4, 66.

KERR-WALLER, R. D.
Automated information dissemination system (AIDS): technical evaluation. *Information Scientist,* vol.1, no.2, September 1967, p.51–72. Presented at a joint meeting of Aslib, the British Computer Society, and the Institute of Information Scientists, 8th February, 1967.

KIMBER, RICHARD T.
Conversational circulation. *Libri,* vol.17, no.2, 1967, pp.131–41. Description of computerised system for circulation of books at Queen's University, Belfast.

KRAFT, MARGIT
An argument for selectivity in the acquisition of materials for research libraries. *Library Quarterly,* vol.37, no.3, July 1967, p.284–95.

LECHMANN, HEINZ
Wissenschaftliche Dokumentation und Spezialbibliotheken — Elektronische Datenverarbeitung. (Scientific documentation and special libraries—electronic data processing.) *Nachrichten für Dokumentation,* vol.18, no.5, September 1967, p.164–170.

LIVINGSTON, FRANCES G.
A semiautomated journal check-in and binding system; or variations on a common theme. *Bulletin of the Medical Library Association,* vol.55, no.3, July 1967, p.316–20.

MARKE, JULIUS J.
Copyright revisited. *Wilson Library Bulletin,* vol.42, no.1, September 1967, p.35–45.

MEDLIN, JOHN
Light the working area, not the task. *Administrative Management,* vol.28, no.2, February 1967, p.42, 44, 46.

MENHENNET, D.
The House of Commons Library: research and information services. *Information Scientist,* vol.1, no.2, September 1967, p.75–83.

MERTA, AUGUSTIN
Czechoslovak organisation of scientific and technical information. *Library World,* vol.69, no.807, September 1967, p.57–8, 61.

MOHRHARDT, FOSTER E.
Current developments in the communication of scientific information in the United States. Copied from *ASLP Bulletin,* vol.12, no.3/4, September-December 1966, p.39–55.

MOROZOVA, E. N.
Some trends in the mechanization of library and bibliographical operations at the State Public Library for Science and Technology of the USSR. *Libri,* vol.17, no.2, 1967, pp.142–5.

NELSON, JACK R.
The blue book versus the red book; some reflections on the new cataloguing code. *Australian Library Journal,* vol.16, no.3, June 1967, p.119–23.

PIERCY, ESTHER J., *and* TALMADGE, ROBERT L. *eds.*
Cooperative and centralised cataloguing [special issue]. *Library Trends,* vol.16, no.1, July 1967, 175p.

PIETSCH, E. H. ERICH
Stand und Entwicklungsmöglichkeiten der automatischen Dokumentation. Bilanz über den Einsatz der Elektronik im Informationsbereich. [Present status and development possibilities of automatic documentation. A summing-up of the use of electronics in the information field.] *Nachrichten für Dokumentation,* vol.18, no.5, September 1967, p.156–63.

PINGS, VERN
A study of the use of materials circulated from an engineering library, March to May 1956. *American Documentation,* vol.18, no.3, July 1967, p.178–84.

RAYWARD, W. BOYD
The UDC and FID—a historical perspective. *Library Quarterly,* vol.37, no.3, July 1967, p.259–78.

RUSSELL, JOHN R.
First seminar of Indian university librarians. *College and Research Libraries,* vol.28, no.5, September 1967, p.326–30.

SHERA, JESSE H.
Librarians against machines. *Wilson Library Bulletin,* vol.42, no.1, September 1967. p.65–73.

STANGL, PETER, *and* KILGOUR, FREDERICK G.
Analysis of recorded biomedical book and journal use in the Yale Medical Library. Part I: Date and subject relations. Part II: Subject and user relations. *Bulletin of the Medical Library Association,* vol.55, no.3, July 1967, p.290–315.

TOMAN, J.
Problems of indexing and classification in Czechoslovakia. *The Library World,* vol.69, no.807, September 1967, p.66, 68, 70, 72.

TOMAN, J.
Die unterschiedliche Rolle eines Ordnungssystems in der traditionellen und maschinellen Dokumentation. [The different role of a classification system in traditional and machine documentation.] *Nachrichten für Dokumentation,* vol.18, no.5, September 1967, p.181–4.

TOWNLEY, HELEN
Documentary information retrieval. *Data Processing,* vol.9, no.5, September-October 1967, p.268–75.

TOWNLEY, HELEN M.
It isn't a science. *Information Scientist,* vol.1, no.2, September 1967, p.49–50.

UNIVERSITY of Chicago to set up total integrated library system, utilising computer-based data handling processes. *Scientific Information Notes,* vol.9, no.3, June-July 1967, p.1–6.

VEASEY, W. I.
Comparative index to periodical prices. *Library Association Record,* vol.69, no.8, August 1967, p.274–6.

VOGT, HELMUT
Die automatisierte Katalogisierung von Zeitschriften und Serien an der niedersächsischen Staats- und Universitäts- bibliothek in Göttingen. [The automatic cataloguing of newspapers and serials at the Niedersächsischen Staats- und University library in Göttingen.] *Zeitschrift für Bibliothekswesen und Bibliographie,* vol.14, no.3, 1967, p.135–42.

WARHEIT, I. A.
Current developments in library mechanization. *Special Libraries,* vol.58, no.6, July-August 1967, p.420–6.

WELLS, A. J.
Centralised cataloging in Great Britain. *Library Trends,* vol.16, no.1, July 1967. p.143–8.

WENTE, VAN A., *and* YOUNG, GIFFORD A.
Selective information announcement systems for large community of users. *Journal of Chemical Documentation,* vol.7, no.3, August 1967, p.142–7.

WHITAKER, LEWIS A.
Magnetic tape library: management and control. Copied from *Journal of Data Management,* vol.5, no.6. June 1967, p.28–33.

WIESENBERGER, IVAN
Education for librarianship and information work in Czechoslovakia. *Library World,* vol.69, no.807, September 1967, p.51–2, 54.

WOLFE, MOLLY A., *and* HERNER, SAUL
SDI system for the U.S. Public Health Service, Office of Pesticides. *Journal of Chemical Documentation,* vol.7, no.3, August 1967, p.138–41.

WOLK, L. J. VAN DER
Die Automatisierung in allgemein-wissenschaftlichen Bibliotheken und ihre Bedeutung für die Spezial-Bibliotheken. [Automation in general scientific libraries and its importance for special libraries.] *Nachrichten für Dokumentation,* vol.18, no.5, September 1967, p.174–6.

ZIMMERMAN, DIETER
Classification to aid the innovator. *New Scientist,* vol.35, no.561–7, September 1967, p.496–8.

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Required by ALBRIGHT & WILSON (MFG) LTD., Oldbury, Birmingham. Duties include information retrieval and dissemination, administration of the library (located in the Research Department) and the operation, or improvement, of existing systems. Outside contact with Aslib, other libraries and companies is also involved.

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The Head Office Library and Information Service maintains a comprehensive technical and general library and acts as the central reference source for the Company. It also operates a circulation and distribution system for periodicals and Sales Promotion literature in order to maintain the flow of current information to staff in the United Kingdom.

The Company Librarian has a staff of four, is responsible for the maintenance and operation of the library including indexing and cataloguing, obtaining appropriate publications and control of the budgets.

Ideally applicants should be Chartered Librarians with associateship of the Library Association and have three or more years' experience in this field. Some knowledge of computers would be appropriate, but background training would be provided as necessary.

Apply quoting reference number 201/1 to B. W. Crisp, Central Recruiting Services, International Computers and Tabulators Limited, I.C.T. House, Putney, London, S.W.15.

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Aslib Membership List 1967

A complete list of members of Aslib arranged alphabetically under country of location. Details include full address, telephone and telex number, and name of representative (for corporate entries). A second main section lists corporate members under classified subject headings.

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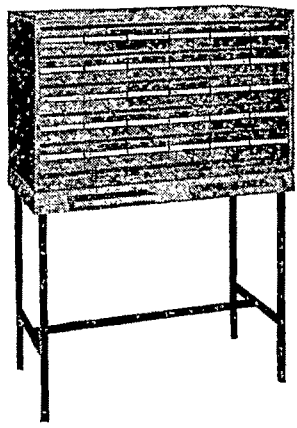

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Aslib Proc. vol.19 no.12 pp.395-446 London, December 1967

ASLIB PROCEEDINGS

incorporating Aslib Information

Volume 19 **December 1967** **Number 12**

ASLIB CALENDAR 1968

January

FRI.5.	Engineering Group. One-day conference on bio-medical engineering.
MON.8–FRI.12.	Course on Co-ordinate Indexing.
TUE.9.	Chemical Group meeting: 'How good is the Kent Service?' by Dr A. Kent.
TUE.23.	Evening meeting. 'The proposed World Institute for Documentation of Housing, Building and Planning.'

February

TUE.20.	Evening meeting. 'Many questions,' by Mrs E. Mack. See paragraph below.

March

THU.21.	Afternoon meeting at Aslib. 3 p.m. 'The computer: what it is and what it can do,' by Miss A. Chilton, Senior Lecturer, Birmingham College of Commerce.
FRI.29.	Scottish Branch—Annual General Meeting and one-day conference.

April

TUE.23.	Second Aslib Annual Lecture, by Sir Frank Francis.

Aslib short courses

In response to increased demands from members for short courses on all aspects of information work, a greatly extended programme of courses, totalling something approaching 130 days, is being planned for 1968. Apart from providing established courses more frequently a number of new ones will be offered: details of those planned for the first quarter of the year will be found in the list on page 398 and it is hoped to include courses on the general problems of introducing mechanization into library and information systems and on more detailed aspects of mechanization such as systems analysis. Courses on the handling and exploitation of special materials will include one on maps, an advanced course on patents and an advanced course on business information. A number of courses are being planned jointly with Aslib Groups and with other bodies, and advance details of these will appear in subsequent issues.

Biomedical Engineering

A one-day conference on information and library services for biomedical engineering to be held on Friday 5th January 1968 is organized jointly by the Biological and Engineering Groups of Aslib, the Biological Engineering Society, and the Hospital Physicists Association. There will be five papers: 'Introduction to the problems of obtaining information from the users point of view', by H. S. Wolff; 'Sources of biological engineering information', by C. P. Auger; 'Library services and the biomedical engineer', by A. G. Pate; 'The production of an abstract service in the fields of physics, medicine and biology', by R. G. Wood; 'Project FAIR', by A. G. A. Pickford.

The conference will be at University College, Gower Street, London W1, and the fee will be £2, including lunch.

Further information may be obtained from Mr B. R. Styles, Technical Librarian, Ministry of Public Building and Works, Chessington, Surrey.

Information Scientists' Conference

The Institute of Information Scientists will hold its Bi-annual Conference at Sheffield University from Tuesday 23rd to Thursday 25th July 1968. It is expected that about 150 professional information scientists will attend and a civic dinner will be given at the start of the conference.

Further details may be obtained from the Organizer, Mr R. Sewell, United Steel Companies, Ltd, Research and Development Department, Swindon Laboratories, Rotherham.

Fellowships at Berkeley

The School of Librarianship and Institute of Library Research, at the University of California, Berkeley, has announced the following fellowships and research assistantships for the academic year 1968–9.

For study leading to the Ph.D. or DLS degree: Higher Education Act Fellowships ($5,000); Two University Fellowships ($3,000); Eight research assistantships ($2,390 and $3,348).

For study leading to the MLS degree: Higher Education Act Fellowships ($2,200); one scholarship ($600); nine research assistantships ($2,390 and $3,348).

Applicants should write to the Dean, School of Librarianship, University of California, Berkeley, California 94720.

British Associations

The 2nd Edition, dated 1967–8, of the *Directory of British Associations* was published in October. Over two thousand associations have been added since the 1st Edition, bringing the total number of organizations listed to approximately six thousand. Because a very large proportion of the associations are run by honorary officers from their business or private addresses and can be extremely difficult to trace, special efforts have been made to include the highly specialized and hard-to-find societies.

Information about individual organizations has been greatly extended and now includes besides address, date of formation, etc., details of activities, e.g. Conferences, Education and training, Research, Export promotion, Information services.

In response to requests from users of the 1st Edition, shortened names, enabling associations to be identified at a glance, replace the former system of reference numbers used in the indexes, and this makes the directory much quicker and easier to use.

The *Directory of British Associations* is published by CBD Research Limited, price £4.

'Many Questions'

We are glad to report that Mrs Mack has been persuaded to come and talk at the evening meeting on Tuesday 20th February 1968 about some of the inquiries she has received during her many years as Information Officer at Aslib.

Translations

Yet another new publication concerning translations is now being received regularly by Aslib. This is the *Translations Register-Index,* which is issued by the Special Libraries Association Translation Center, and indexes all translations added to the collection there. Arrangement is similar to that of *Technical Translations,* with COSATI subject headings; in its index section the list duplicates some of the entries from *Technical Translations.* The *Index* is to cumulate quarterly, but as yet no issue has reached us.

Entries from *Translations Register-Index* are being included in the Aslib copy of the Commonwealth Index of Unpublished Scientific and Technical Translations.

Short Courses: January–March 1968

The following list was compiled by OSTI at the suggestion of the Committee on Short Courses in Librarianship and Information Work, which was convened by the Department of Education and Science. The Committee includes representatives of the Library Association, Aslib, SCONUL, the Association of British Library Schools, and the Institute of Information Scientists. It is hoped that the list will give employers and prospective students reasonable notice of the courses that are available and will also help in the planning of courses.

LIST OF SHORT COURSES IN LIBRARIANSHIP AND INFORMATION WORK PLANNED FOR JANUARY TO MARCH 1968

Dates	*Total no. of days*	*Subject*	*Location*	*Cost*	*For whom intended*	*Organization and Collaborators*	*Inquiries to*
Jan. 8–12	5	Scientific literature and its guides	NLL	*Nil*	University Academic staff	NLL	Dr K. P. Barr, NLL
Jan. 8–12	5	Management for Libraries	Loughborough Univ. of Technology	£15 to £20	Senior university library staff	Loughborough Univ. of Technology	Dr A. J. Evans, Librarian, Loughborough University of Technology, Loughborough, Leics.
Jan. 8–12	5	Co-ordinate indexing	London	30 *gns*	Graduates or equivalent qualification or persons with experience of library or information work	Aslib and Aslib Co-ordinate Indexing Group	Education Officer, Aslib, 3 Belgrave Square
Jan. 16–19	4	Junior Introductory course	London	9 *gns*	Non-graduates in first year library or information work	Aslib	Education Officer, Aslib
Jan. 22–25	4	Management Course on Staffing	Lodge Hill, Pulborough, Sussex	£12 10*s*	Senior librarians	Association of Assistant Librarians	E. C. Winter, BA, FLA, Central Library, High Street, Gillingham, Kent
Feb. 5–9	5	Workshop on Law Librarianship	Leeds/Harrogate	£12	Assistant librarians in law librarianship	Leeds College of Commerce	D. Daintree, Esq., Dept. of Librarianship and Information Science, Leeds College of Commerce, 28 Park Place, Leeds 1

List of Short Courses in Librarianship and Information Work planned for January to March 1968—*continued*

Dates	*Total no. of days*	*Subject*	*Location*	*Cost*	*For whom intended*	*Organization and Collaborators*	*Inquiries to*
Feb. 6	1	Microfilm Applications	Hatfield College	£3	Personnel engaged in microfilm work in libraries	Hatfield College of Technology	National Reprographic Centre for Documentation, Hatfield College of Technology, Hatfield, Herts.
Feb. 8–9	2	Business Information	London	7½ *gns*	Open	Aslib	Education Officer, Aslib
Feb. 12–16	5	Document Reproduction	Hatfield College of Technology	£10	Office executives, O & M Officers sales representatives and those engaged in reprography	Hatfield College of Technology	National Reprographic Centre for Documentation, Hatfield College of Technology, Hatfield, Herts.
Feb. 27–28	2	Work with patents	London	7 *gns*	Library or information staff	Aslib	Education Officer, Aslib
Mar. 4–8	5	Introduction to Management for librarians	Medway and Maidstone College of Technology	4 *gns*	Qualified librarians	Library authorities in area	P. O. Hart, Principal Lecturer, Dept. of Management and Social Studies, Medway and Maidstone College of Technology, Horsted, Maidstone Road, Chatham, Kent

LIST OF SHORT COURSES IN LIBRARIANSHIP AND INFORMATION WORK PLANNED FOR JANUARY TO MARCH 1968—*continued*

Dates	*Total no. of days*	*Subject*	*Location*	*Cost*	*For whom intended*	*Organization and Collaborators*	*Inquiries to*
Mar. 22–25	2	Anglo-American Cataloguing Rules 1967	University of Nottingham	£10	Cataloguers and lecturers in cataloguing	Cataloguing and Indexing Group of Library Association	J. C. Downing, Hon. Sec., Cataloguing and Indexing Group (LA), c/o BNB, British Museum, London WC1
Mar. 26	1	Microfilm Applications	Hatfield College	£3	Personnel engaged in microfilm work in libraries	Hatfield College of Technology	National Reprographic Centre for Documentation, Hatfield College of Technology, Hatfield, Herts
*Mar. 27–April 5	8	Scientific literature and its guides	NLL	*Nil*	University Library staff	NLL	Dr K. P. Barr, NLL
*Mar.	5	Dissemination of information	London			Aslib	Education Officer, Aslib
*Mar.	5	Hospital librarianship	London		Secretary/librarians	Aslib	Education Officer, Aslib

* Tentative

Internationales Bibliotheksadressbuch (World guide to libraries), compiled by Klaus Gerhard Saur. München-Pullach, Verlag Dokumentation, 1966. 2 vols.

The first volume covers libraries in Europe, the second those in Africa, America, Asia, etc., with a subject index to the fields in which they collect. The guide is classified by continent, followed by country. Within each country, entries are grouped under cities and towns in alphabetical order.

Each entry shows the name and address of the library, its year of establishment, number of volumes held, fields of collection, special fields, and the type of library concerned. There is an introduction in both German and English in each volume.

Technical Journals for Industry

Three countries have now published national lists as part of the FID's *Technical journals for industry* (FID 415) project. These are:

Canada: published on behalf of the FID by the Technical Information Service of the National Research Council of Canada, Ottawa, 1967. 17, 7 p.

Finland: published on behalf of the FID by Suomen Kirjallisuuspalvelun Seura-Samjundet för Litteraturjänst i Finland, Helsinki, 1967. 17, 4 p.

Poland: published on behalf of the FID by Centralny Instytut Informacji Naukowo Techniczne, Warsaw, 1967. 36 p.

In the FID 415 lists, information on selected journals, including publication data, field covered, content (original articles, surveys, abstracts, etc.), reader target, emphasis and price, is presented in a standardized form as prescribed by the FID. It is hoped that this will eventually lead to a select world list of technical journals for industry.

Mrs Joyce Lancaster-Jones

The recent retirement of Mrs Joyce Lancaster-Jones from the British Council brings to an end a professional career of some distinction. Her service to Aslib has been no less outstanding. Elected to Council in 1949, Honorary Secretary of Aslib from 1955 to 1960, and an elected member again from 1960 to 1966, she has served for a total of eighteen years on the Aslib Council. Since 1948 she has been a member, at one time or another, of most Committees, and has been especially prominent in her service on the International Relations Committee, representing Aslib abroad on a number of occasions.

We wish her well in her retirement and hope to have the benefit of her knowledge and experience on the International Relations Committee, on which she has served since 1952, for many years to come.

THE ONE-MAN INFORMATION UNIT—UTILIZING THE ASLIB NETWORK

H. THORNTON
TMM Research Ltd.

Paper presented at the 41st Aslib Annual Conference, Harrogate, 9th–12th October 1967

AT the outset of this short paper I must underline the fact that I speak from experience of the textile industry only—that is, machine manufacture and textile technology—and recognize the fact that in other spheres, for example nuclear energy and space technology, requirements may be completely different. However, since I reckon I am representative of any number of smaller libraries, I hope what I have to say may have some relevance

I shall refer to 'the librarian' and by that term cover also intelligence officer, information scientist, or whatever name you have been given or chosen to adopt. I am well aware of the subtleties of these various titles, but choose the simplest.

In common with many other libraries mine is run on a small budget that does not allow for elaborate aids or large staff, but, nonetheless, first-rate service is expected.

So much is now written and said about the use of computers for information retrieval that the impression is given that any library still dabbling with decimal classification and co-ordinate indexing is lagging well behind. But I have no wish to be rushed into the adoption of computer retrieval solely to keep up with the Joneses. Since it is going to be some years before we can rely exclusively on computers it looks as if we shall have to make the most effective use we can of existing systems. I am not overlooking the fact that computerized information retrieval is now being utilized in a number of spheres, but such systems are well beyond the pockets of most industrial libraries and hence we are witnessing the development of retrieval centres. Let us not overlook the fact, however, that much of the work in the average library consists of many tasks which do not necessarily lend themselves to computerization. That being the case I must continue for some time to cope manually with the information explosion.

What does the explosion mean to me? The accepted measure is the increase in the number of periodicals published and the increase in numbers of pages per issue. This is brought about not only by the fact that there is admittedly a growth in the amount of scientific and technological work to be reported, but also by the fact that commercial interests are at work. Consequently, we have seen a corresponding increase in the amount of advertising and what I term sponsored articles. You are all by now familiar with the controlled

circulation periodicals, some of them excellent, but all of them published largely in the interests of their advertisers. I think, also, we are all familiar with the same piece of information dressed up in various guises and repeated in various places over a period of anything up to twelve months. In an industrial library it is a profusion of this type of information that we find ourselves having to cope with rather than the more academic or research type of paper.

Are we, then, to make a superhuman effort to cope with all this mass of material? At its present rate of growth will we, even with the aid of computers, be able to handle this ever-increasing amount of material? I suggest that computers are not the sole answer. So frequently the stress is on the *retrieval* half of the system, and almost casual reference is made to the amount of human effort required to feed the material initially into the computer. Somewhere, someone has actually to read or scan every article which is considered worthy of recording. No matter how quick the computer's handling of the information, the material has first to pass through human hands. There is no question that the computer itself can cope, but can *we* continue to do so? Rather—and this seems an impossible hope—I would like to see a movement for the suppression of a lot of unnecessary information at source. It is now far too easy for people to go into print, and some publishers of periodicals seem only too happy to print whatever is presented to them. Since suppression at source is at the moment improbable, I suggest that we should cease to try to find ways and means to handle more and more information, but become increasingly critical and selective in what we record.

I think we are in danger of spending more and more time and effort in processing information than is used in actually utilizing it. In devising bigger and better systems of information retrieval let us not overlook *why* we are doing this. Should we not first consider if our 'customers' are likely to use, or even want, all the information we are so carefully recording. You may devise a computer system that can digest and spew out information at fantastic speeds, but the average reader's rate of intake will not vary. I suspect that more and more people are concerned with processing, whilst fewer and fewer people have time to read. Do our engineers and technologists really want to face up to this volume of the printed word? Surprisingly, they still rely very heavily on other human beings for their information. Ability to scour the world's literature for information may provide proof of the efficiency of your library, but try offering to a hard-worked engineer a selection of articles, some of which are in lesser known languages. I don't have to tell you the response. Interesting, also, is the fact that an engineer's requirements are usually met from a very small range of publications, often, too, from those of his own country—and not necessarily because of language. American methods, for example, are often noted but not necessarily followed.

How, then, does the small-time librarian handle this increasing flow of information?

First, he specializes. A librarian, in time, becomes closely identified with his firm's subject interests and those of his readers. This is his greatest value to the firm. He should accumulate a detailed knowledge about those interests. This will involve the reading of relevant literature and that reading should not

merely be a scanning for keywords for record purposes, but an intelligent appraisal of the content matter. How otherwise can a librarian hope to talk on equal terms with those who use his library and understand their queries? Let us not turn ourselves merely into a lot of data processors. A librarian should recognize the impossibility of coping with the ever-increasing amount of information even within his own field. After consideration and consultation with his management, he should set boundaries beyond which he will not seek to collect his own information, but rely instead on other specialist sources. I shall return to this point. Incidentally, I am not suggesting that those boundaries should be inflexible, but rather that they should be revised periodically as company needs dictate.

One of the librarian's functions should be to evaluate. Here, I know, I am on dangerous ground. Who is to say what is important and what is not? But I consider this to be one of the marks of a true librarian or information officer. A well-informed librarian who knows enough about his company's business should be able to risk evaluating articles and help his readers sift out what he knows to be pot-boilers, repeats, rehashes and the like—and let us not forget that this is what a lot of the 'explosion' consists of. He will not waste time recording them all. He will be selective. If this suggestion causes you some alarm, I will confess that for long enough I sought to record every scrap of information that could be of use. I now face the fact that this is no longer a proposition, nor is it necessary.

Another of his functions should be to recognize the significance of a piece of information even if it consists of only two lines, and see that it gets to the right people. So often, in a small industrial library, the inquiry is of the type that neither lends itself to nor warrants the full treatment of a complicated retrieval system. Commercial information, which plays a very important part in an industrial library is, for example, of passing interest, vital one week, dead the next. In these circumstances it is not sufficient for a librarian to rely on a store of references to past work. He must be adept in anticipating a company's need for certain information. He must be able to discern and interpret trends. Of vital importance is the dialogue between librarian and library user. It is not enough to have a list of so-and-so's interests, whether stored in a computer or otherwise. Regular contact with staff can reveal unsuspected facets to their work. A librarian can frequently function as a liaison man. Scientists rely more on humans than the printed word for their information, more than we care to admit, and the librarian can frequently put staff in touch with each other, and not only in their own organization. It is here that I come to the point of my paper, that is, utilizing the Aslib network.

It is in this sphere of liaison that the groups have an important part to play. Take the textile group as an example. Whilst there is a certain amount of overlap in the interests of member firms, each library has its own specialized interest and covers that field in depth. What more sensible than to consult that library when you require information in its field. Close contact with other members of the textile group has meant that I have become familiar with their coverage and feel confident that their specialist information will be put at my disposal whenever I require it, and the same is true for our own organization.

From past experience I have found that one's own 'difficult' questions are frequently common knowledge in another library and what is more the staff are invariably only too happy to share that knowledge. The smaller library would do well to follow this approach and concentrate on utilizing specialist sources outside its own field, rather than attempting the impossible task of building up a wide store of information.

Lest you consider my attitude somewhat reactionary, I must tell you that I have looked into the possibility of utilizing a company computer. Even were that computer suitable for the purpose I envisaged—and apparently it was not—I could foresee considerable handicaps in using such a system. I should have to share time with a number of associated companies and would have to take my turn in the queue. Questions, now answered immediately by reference to our card catalogue, might be delayed for a day or more—a situation not accepted with equanimity by someone anxious for a quick answer. This was only one of a number of drawbacks.

However, whilst I cannot foresee computerized retrieval in our own library for some time to come, I am watching developments closely and am, in fact, a member of a commission working on a four-language textile thesaurus which will form the basis of what it is hoped might eventually become an international system. I feel it would be entirely uneconomic for a small library to embark on a computerized system in isolation, and I look to the time when in this country we may have an industry-based scheme similar to two which have been developed in the States for the use of the textile industry.

TIME TO THINK—USE OF THE SYSTEMS APPROACH TO THE PROBLEMS OF THE 'ONE-MAN' INFORMATION UNIT

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ONE result of being a 'small' librarian has been that, although hired to provide a current awareness service and write reviews for a research staff, I must spend a proportion of my time in arranging for the buying, cataloguing, lending, borrowing and binding of books and other material. However, I do not see these two sorts of activity as separate in any way, but as both containing elements of two fundamentally different approaches to human effort, which I shall call the professional and the clerical. If I was entirely on my own, my professional hat would be worn when deciding what book to buy, what words to use as indexing labels, what ideas in a paper were relevant, what advantages a newly available reproduction process would have over the system in use in my library. My clerical hat would get an airing when I passed on a request for a book purchase, typed and filed the index cards, or arranged for a record of a loan to be made.

Of course, even a small librarian has clerical help. However, the administration of any library requires that time be available for forward planning, in addition to that required for the day-to-day professional effort. In short, a librarian, like any other administrator, needs *time to think*. To make sure that I have that time, I enlist the aid of the systems approach to make the overall library effort economical in the use of time.

The Systems Approach

On a first appraisal, it would seem that systems analysis and design have little to do with the planning of a small unit like the one-man special library. Traditionally, systems design involves large numbers of people and things, and a machine. But the principles of the systems approach are applicable to any system, however small, and what more suitable than a situation where one person is entrusted with two jobs—the collection and storage of documents, and the exploitation of their contents on behalf of other people.

The special libraries of the larger companies, the giants, generally show the same dichotomy, but on a much grander scale. They usually consist of a library proper, where documents are stored, where indexes are kept for their location, and where a reference service is sometimes provided, and a separate information section, staffed with scientists or engineers, who indulge in two

separate kinds of activity. They provide for those working on the bench a constant flow of information based on a detailed knowledge of their work, and they back up the library location indexes with more detailed indexes to company reports, and with some sort of retrospective search tool in the special areas involved.

It seems unfortunate that, although the use of the 'systems' concept in library work has been written about for over twenty years,[1–6, 13] its widespread application has had to wait until the machines came. More recently, punched card and computer techniques have been applied to all three of the special library functions by the giants,[7] seldom resulting in a reduction of costs, but inevitably leaving the staff with more time to think about the 'why' of what it is they are doing.

There is no need for the small librarian to mimic the giants in the application of machines to a large proportion of the library effort, because his work is on a much smaller scale. What he should do is to make use of the same principles of design and forward planning which are implicit in computer systems, to leave himself with more *time to think.*

If the systems approach can be said to have a basic principle it must be that systems planning starts by asking 'what are the requirements?' and then 'how can they best be satisfied with the existing technology and the available resources?'

Most library systems arise by adoption or adaptation of existing solutions. This is sad because it means that *an arbitrarily chosen system has more influence on the library operation than do the real requirements.* Book arrangement by the Universal Decimal Classification is fine for a library whose stock covers a wide subject area, but in a library devoted to the needs of a research group in a small, specialized subject area, it introduces more problems than it solves. Solutions, selected for their advantages, should be examined as well for the constraints which they would exert on the overall operation.

Systems planning requires that we discover what services are required before setting up shop. This is so obviously a prerequisite of *any* service that it is unfortunate that, because of lack of time to think, the sort of service commonly provided in a special library is so unrelated to the known requirements of users.

By now we should all be aware of the ratings which scientists give to the available ways of finding things out. Much of what has emerged is arguable, but a study of one of the surveys of user surveys[8] reveals certain facts which are uncovered each time an inquiry of this sort is carried out. Regular perusal of the literature, use of informed reviews, talking with colleagues, use of a personal file, are all rated as popular ways of getting information. Lists of references supplied by the library, use of the library catalogue, and asking the librarian all commonly get the bird.

It seems that scientists prefer informed reviews to library bibliographies, a search-tool which they can get to know on their home ground to the card catalogue,[9] and a chat with a colleague to an encounter with the librarian.

Although the larger special libraries search the whole of the pertinent literature on behalf of their customers, either as primary journals or through

abstract publications, the small special library, if it does anything at all beyond merely displaying the material, arranges for it to be circulated to those who request the service.[11] In view of the declared importance of regular perusal of the literature, dissemination by haphazard circulation is clearly leaving things too much to chance.

A great deal of time is spent in many large and small special libraries in making an abstract of items selected by the customers, or by the information staff. This is put into some sort of file intended for retrospective search, under keywords or a subject heading chosen by the special librarian. Now it is well known that scientists keep personal files of items of interest.[10] They also annotate the cards or slips with an abstract which indicates what the point of the article is for them. Possibly some time could be saved by both customer and librarian if a copy of the librarian's record was given to the customer, and the librarian was made aware of the customer's assessment.

When an inquirer has only a vague idea of what he needs, one can sympathize with his reaction to being handed a library bibliography. It presents under any circumstances a vista of lengthy and possibly unrewarding effort. (If my boss asks me about motivation and non-financial incentives in industry, I know that he isn't going to be too pleased if I lay before him a book on management, or even on personnel management—at least without marking the place.) Service by remote control, via a list of references, is not just a nuisance for the customer, it is bad for the special librarian. It is his admission that he has not arranged his life so that he has time to talk to his clientele.

Just as important as finding out what services are required is the establishment of the means for regular feed-back from the customer. We ought to call on him regularly to find out what he is doing, we ought to have his assessment of the information or documents we supply.

Feed-back from the user is essential to development of the special library service along the same lines as development of the department it serves. So is a constant flow of information from outside on potentially useful sub-systems. I mean ways of doing parts of the librarian's job which are time-saving, or which fit better into the jig-saw of library operations than does an existing piece. Business equipment and O & M publications are a good source of such methods..

A second major precept of systems design is that the operation should be planned as a whole. When a librarian has little time for forward planning, the service tends to grow by accretion. The books-on-shelves aspect is handled by using UDC or a private classification.[11] Then journal circulation gets underway, and there is a feeling that references marked by the staff ought to be indexed for retrospective use. Feature-cards seem appropriate for this. When research reports begin to pile up, some sort of index is clearly necessary. A serial file of abstracts on edge-notched cards is set up . . . and so on. The outcome is a set of unrelated systems, each requiring different methods of compilation, each demanding separate and time-consuming attention.

It is clear that a great deal of thought must go into the special library operation, not only initially, but all the time, to keep the service in contact with user requirements. How can one person find time to do this when he or she has to provide the service as well? What takes up time in a special library that could

more profitably be used in talking with the customers, or developing the service? There appear to be three main time-wasting activities:

Doing non-professional work,
Doing the same thing twice, and
Making decisions.

Doing Non-professional Work

Consider whether your employer is getting his money's worth from you. Is he spending twenty shillings an hour for someone to type cards, make entries in ledgers, sort and file books and pamphlets, put labels on things and punch holes in pieces of paper, when he could have all these things done just as well for five shillings, and pay you twenty shillings to attend to the information requirements of the department?

Any complex operation consists of many discrete steps, some of which require neither knowledge nor discretion in their execution. In the factory and office this has been realized for some time and these steps have been mechanized or allocated to relatively low paid, unskilled staff—why not in the small special library? Allocation of sorting, filing and typing to a clerical assistant is not a difficult task, but the work analysis should go further than this. Those library procedures that are performed most often and by professionals ought to be analysed, and the non-professional steps identified, then simplified so that they can be handled just as well by a clerk. This extension of the concept of 'professional thinking—clerical doing' is useful in the special library in the name of expediency, but one wonders what the effect would be if it received the recognition it deserves in the library world as a whole.

Doing the Same Thing Twice

The necessity for an integrated system to cover all the operations of the special library, professional and clerical, has been mentioned already. When the requirements have been identified, ways of satisfying each separate requirement begin to suggest themselves. *It is important that the ideas should not be allowed to develop into separate systems at this stage, each with its own entry and exit for documents or information.* Instead the attempt should be made to select the most suitable methods, and integrate them into an overall library system. Constructing a flow chart is a useful preliminary to deciding on the overall design. This is a technique which is very useful in the simplification of existing systems. Very often when the details of the entire library operation are charted it is found that the same action is being repeated in different places and at different times, without benefit to the overall library service. Any operation continued long enough gets encrusted with steps which were once useful, but are no longer necessary or with grace notes added by the person to whom the work was allocated, who has not realized that they are not needed for the proper working of the service, or are covered by procedure in some other part of the system. Growth by accretion can produce a system very inefficient in the use of time, unless periodic paper studies are made to get the overall view. A step-by-step description of what is done will show what steps can be elimina-

ted and whether the steps are in the right order. As the Unilever *O & M Bulletin*[12] puts it 'If the system is five years old, it can be simplified.'

Shaw tells the tale[13] of a large American library where five staff members were needed to send five thousand volumes a year for journal binding. A flow chart was drawn and it was found that their efforts constantly interrupted the work of other departments. In addition, they all kept their own set of records of material at the binders. Under the redesigned system when it was known from the check-in file that a volume was complete, the circulation section gathered the parts and checked them out, and the bindery assistant made out the order. The preparation unit checked the books returned from the binders and handed them over to the circulation unit. In this way the work of sending and receiving back a binding order was split into parts compatible with the normal routine of each section and integrated with that routine. The work of each section was no longer interrupted and one assistant, with a part-time helper, was able to handle nine thousand volumes a year.

Scratch any computer-based record system and you will find the twin ideas of 'unit entry' and 'making-one-record-do-several-jobs'. Unit entry has been made use of in libraries ever since the card catalogue was introduced. A list is maintained as a series of units of similar size and shape. To keep the list up to date, one merely adds another unit. Another example is the familiar Stripindex. The principle can be applied in the one-man special library to produce copies of lists which always contain a mixture of old and new material, without having to type and check the complete list each time it is produced. Lists of wants, or items for disposal, or indexing vocabularies, can all be accumulated in unit form, and printed out at intervals. The units may be keypunched on to machine-processable cards, which are made to produce a list by being passed through a document-writing machine; or they can be typed on to cards or slips which are arranged face down on the plate of an electrostatic copier. List compilation by unit entry is timesaving for the small librarian because the list does not have to be typed and checked each time it is produced. It is convenient, because by feeding the document-writer or copying machine with offset printing masters, multiple copies of the list can be made, and because there is available at all times an up-to-date list in unit form.

The idea of making one typing or keypunching do several jobs is fundamental to the systems method. Coding or writing data on to punched cards, and then using this single machine-processable record in several ways is the usual approach. The concept can be a powerful tool in the production of an integrated, time-saving system for the small special library. In my own library an information bulletin, slips for scientists' personal files and for the library indexes are all produced from a single typing on offset masters. The same system can handle periodical articles, books and monographs, patents, company reports, book reviews, new books noted, and announcements of scientific meetings and courses.

The routines associated with borrowing and lending and purchasing in a small special library are no less heavily used just because it is a small library. If they can be simplified the time saved will be quite substantial. A time-saving system based on the use of a standard library form, which reduces the amount

of re-copying which has to be done from the receipt of a request to the return of the document to the lending library is exemplified by the well-known National Lending Library form. When the library clerk writes a request to NLL, she also prepares her own record of the request, a label for the parcel, and a sticker for the item sent from NLL. This is a superb example of the sensible use of form design to save time all round. There is a lot to be said for a standard form of this sort of inter-library loans generally. It is as well to remember, however, that the art of form design is concerned as much with economic design of a system, as with how best to lay out a form. When the O & M specialist is called in to advise on changes in a business office, his first job is very often to eliminate as many pieces of paper as possible, not to add to the pile.

Making Decisions

No one would suggest that a special library could be run *without* making decisions, and I would certainly not recommend putting off decisions in the name of time-saving. But the fact remains that decision-making is a very time-consuming process. Why is this, and what can be done to reduce the amount of time spent on decision-making?

To make decisions two things are required: knowledge[14] and a framework. A decision on a new journal subscription requires knowledge of user demand, and cost, but it must also be considered in the light of a previously worked-out attitude to the use of scientific journals in the special library concerned.

Decision-making becomes a time-consuming activity when, at the time the decision is to be made, we realize that no facts are available to illuminate the dilemma. For instance, I know from experience the usefulness of user surveys and opinion polls when subscription-renewing time comes around, but I have found that a steady accumulation of data throughout the year on the use of existing material and demand for journals not subscribed provides a much more reliable basis for important decisions than does a snap poll. A steady flow of information of this sort is easy to obtain and does not have such a disrupting effect on the work of the department.

The main source of vacillation at times of decision in the special library is usually due to the lack of a framework on which to hang a decision. I mean by this no philosophy of the library service as a whole to indicate what sort of decision is appropriate. A decision on book purchase rests not only on how many people have asked for the book, and how much it costs, but on whether it is the sort of treatment which is needed to supplement the existing collection. The decision to buy a journal rests not only on user demand and price, but also on whether, for instance, it is the sort of publication which belongs in a permanent reference collection. If it lies just outside the main area of interest, it may be one of a group of journals which are taken because they are not abstracted in any other publication, or because they contain material which is useful, but never finds its way into abstracts.

The special librarian who wants to avoid lengthy soul-searching over every small decision will create an atmosphere in which decisions make themselves by arranging to have a steady flow of useful information from his customers,

and by working out the framework of his library service in advance.

The framework must extend to cover all aspects of the library service, including the indexing of materials. (By an index I mean a device based on the use of labels to describe documents or information, which can be used for finding them.) The decisions involved in the upkeep of library indexes are almost certainly the ones which are the most time-consuming. *In a one-man library there must be a framework on which to hang indexing decisions, if constant vacillation is to be avoided.*

Basically, the task is to construct a list of labels, which the librarian and his customers can use to locate information in the form of data or an article. Certain things at once become obvious.

1. The labels must describe as closely as possible the ideas or data which is locatable by their use. On the other hand, since they are only labels, they mustn't be more than a few words long.

2. The list of labels must be maintained in a form which can be added to continuously, as new ideas are documented.

3. The customer must be familiar with the list of labels, in the sense that he must know which labels to use to make the fullest use of the available documents or data in the library file. An index ought to help an inquirer pass from the vague formulation of an inquiry in his mind to its more precise formulation in terms of the index.[15]

4. Some sort of additional information ought to be provided with the heavily used labels, so that an inquirer can select at the index-consulting stage from the large number of separate documents or sets of data to which they refer him.

The above four requirements are more or less satisfied by a variety of indexes, but most indexes fall down rather badly on requirement 3. The customer isn't often familiar with the list of labels, and which labels to use. This is probably because nearly all librarians use the alphabetical subject indication approach, and it may be the reason why library card indexes are mostly used by librarians, not customers.

A 'subject' is really a box, which contains a selected volume of a part of knowledge, obtained by arbitrary division of this part. The penalty of subject-formation by an attempt at delineation is that one has to live with the limits one has set. In other words, if one is using a pile of subject boxes to index a real-life idea or piece of data, time is spent deciding which of the existing boxes to use. Quite often an idea does not fit one of the boxes in the pile. Do we knock up another box, or use a box it does not quite fit?

Obviously there has to be *some* form of control, since by constant addition of subject boxes the choice of possible boxes increases, thus compounding the dilemma. We can limit the number of boxes, as is done in a feature-card system using a limited number of descriptors, or a serial file of abstract plus index on machine-sorted punch cards. But where the index is to follow closely the development of the department it serves, controlled *growth* of the list of labels is a necessity.

The co-ordinate index on feature cards which is so popular in special libraries can, in fact, be made to satisfy most of the requirements enumerated above for a special library index. But its labels share with the alphabetical subject index

the drawbacks of being chosen in an arbitrary manner—they don't always fit, but their growth must be controlled. (Much use is made of the phrase 'open-ended system' as describing the chief advantage of a feature-card index, but as many have pointed out, since the list of labels is used as an authority list when indexing, its growth has to be watched carefully.) In short, the sort of decisions involved in constructing an alphabetical subject index apply to a term index on feature cards as well.

There is a way to index documents or data which ought to be given a chance in manual as well as machine systems. It consists of choosing those words or phrases from the text which describe the important features of the material, and using these as labels. (Incidentally, there is no special magic in using words *from the text*; the words sometimes have to be added.) Word indexing can be used in any system which allows growth of the list of labels—the popular KWIC index[16] is an example of a machine system involving word indexing. It is popular with the customers because they see the words and phrases which they use themselves being used as indexing labels, instead of the elastic-sided boxes of the alphabetical subject index or the authority list, and because it is available as a personal copy in book form, which can be scanned a page at a time. Many librarians dislike it because it is in upper-case at the moment (it is usually printed by a machine designed for rapid communication, not the production of elegant typescript) and because of what they call the imprecision of natural language as an indexing medium. They should realize that word indexing is a boon in disguise. It rids them of the necessity of making continual labelling decisions, and since it is the language of the author, it brings him and his kind into the library to use the index, not as a last resort, but as a matter of course. But most of all it is the only system of indexing capable of assigning truly specific labels—specific in the non-taxonomic sense.

Obviously an alphabetical word index will refer to similar material from labels in different parts of the list. It can be made useable as a searching tool by arranging the labels in groups according to similarity of meaning, and by adding an alphabetical list of all the words and phrases in the system, each giving some indication of the group or groups to which it belongs—by constructing a growing thesaurus, in fact. Word indexing and a thesaurus are useful in the special library because used together they reduce the time-consuming decisions implicit in the alphabetical subject index to the two vital ones—*what is the point of the document, and what is the place of the label in the classified array*? These decisions are easier to make for being hung on a framework of the special librarian's commission to supply his clients with information, not just a list of references, and his determination to provide a search tool which *they* can use easily.

To summarize, the information officer/librarian who runs a one-man special library cannot enjoy the distinction between information work and library work that is implicit in the organization of the information services of the 'giants'. However, he or she should realize that it is the information officer who strokes the librarian, and not the other way round.

The needs of the user and the administration of such a unit require that *time to think* be available. The special librarian can win this time by using the systems

approach to design an integrated special library system which is economical in the use of time, in preference to the adoption of several separate ready-made solutions.

A rigorous separation of clerical from professional effort, the use of a single record to do several jobs, the establishment of channels for regular receipt of information back from the user, and an operating philosophy based on the special requirements of the unit can all help to give the special librarian time to think.

REFERENCES

1 SHAW, RALPH R., *ed.* Scientific management in libraries. *Library Trends*, January 1954 (whole issue).

2 HAYES, ROBERT M. The development of a methodology for systems design and its role in library education. In *The intellectual foundations of library education*, University of Chicago Press, 1965, p. 51–63.

3 BOURNE, C. P. A review of the methodology of library systems design. In *Information systems workshop*, Spartan Books, 1962.

4 MOORE, E. Systems analysis, an overview (The user is part of the system). *Special Libraries*, February 1967, p. 87–90.

5 LAMKIN, B. E. Systems analysis in top management communication (The library from management's viewpoint). *Special Libraries*, February 1967, p. 90–94.

6 DOUGHERTY, R. M., *and* HEINRITZ, F. J. *Scientific management of library operations*. Scarecrow Press, 1966, 258p.

7 COX, N. S. M., DEWS, J. D., *and* DOLBY, J. L. *The computer in the library*. University of Newcastle Library, 1966, 93 pages.

8 BARBER, STEPHANIE. A critical review of the surveys of scientists' use of libraries. In *The provision and use of library and documentation services*. W. L. Saunders, *ed.* Pergamon, 1966, p. 146–.

9 GULL, C. D. Substitutes for the card catalogue. *Library Trends*, October 1953, p. 318–29.

10 JAHODA, G., *et al.* Characteristics and use of personal indexes by scientists and engineers in one university. *American Documentation*, April 1966, p. 71–5.

11 CAMPBELL, D. J., *and* HANSON, C. W. *Survey of information/library units in industrial and commercial organizations*. Aslib, 1960, 40 p.

12 *O & M Bulletin* No. 21. Unilever Ltd., 1958, 212 pages.

13 SHAW, RALPH R. Scientific management in the library. *Wilson Library Bulletin*, January 1947, p. 349–52, 357.

14 BUNDY, MARY LEE. Decision-making in libraries. *Illinois Libraries*, December 1961, p. 780–93.

15 VICKERY, B. C. Classification and indexing in science. Butterworths, 1959, 235 pages.

16 FISCHER, MARGUERITE. The KWIC Index concept: a retrospective view. *American Documentation*, April 1966, p. 57–70.

DISCUSSION

Mr C. J. Eve (Rolls Royce Aero Engine Division) asked Miss Thornton how, in view of her aim of selectivity, she would distinguish between a useful summary of research and a mere 're-hash'. He also suggested that a regular print-out should go some way to overcoming the delays she attributed to computer systems.

Miss Thornton replied that selection should be based on familiarity with periodicals, reading, personal knowledge of authors, etc. On the second point—how frequent would such a print-out be? Once a fortnight? This would be useless, since much can happen in a fortnight.

Dr B. G. Dutton (ICI Mond) remarked that in his organization only a small proportion of the articles needed to be retrieved subsequently. It saved time therefore to eliminate unwanted material at the retrieval rather than at the input stage.

Mr A. H. Holloway (NSTIC) said that the principle of having all jobs done by the appropriate staff could be carried too far. It might well be economic to have work done by higher grades

either because they did it more quickly or more efficiently or because having a job more or less complete in itself gave satisfaction to staff members. As an example, if the filing of index cards were given to anybody not really interested, a proportion of the cards would be wrongly filed and possibly lost for over.

Miss H. M. Townley (IPC Ltd) said that the question of whether the major intellectual effort should come before or after the manual/mechanical effort had not yet received serious enough attention. Was there, in fact, an answer one way or the other, or was this simply a variable affected by the type of system? Ought we to to be giving thought to whether a decision could ever be made?

Mr Whitehall replied that there were two schools of thought here: either one should attach labels to documents from an authority list, or one should file the documents *using the words they contain* as labels. In the latter case retrieval would be more complicated. However, it was said that volume of input to a library file to volume of search requests was probably about 10 : 1, and that time saved on labelling decisions was available at the searching end. This approach was becoming the more popular where machine systems were concerned. He felt that the second approach was more useful not just because of the time factor, but because the indexing vocabulary became nearly identical to the users' vocabulary. The intellectual effort in indexing ought to be reducible to 'what is the value and point of the document' *before* indexing, and 'what is the place of each label in the classified list of labels' *after* the indexing step.

Mr B. Agard Evans (Ministry of Public Building and Works) agreed strongly with Miss Thornton concerning unnecessary material in view of the processing costs. If about 50 per cent of a collection was never used, this was probably right; higher than this would be wasteful —a computer entry, for example, might cost as much as $20. Secondly, separation of professional and clerical work should not be carried too far. If a professional filed catalogue cards, feedback of information would take place on which editing and selection would be based.

Mr Simon Francis (North-Western Polytechnic) said that we should be far more ruthless in refusing to acquire worthless publications and so hasten their demise.

Mr V. Biske (Burmah Oil Trading Ltd) suggested that 'utilizing the Aslib network' could be extended. In addition to the (blue) inquiry form now supplied for return to Aslib, there could be a further form (of a different colour) intended to be sent *direct* to a member who might be able to answer the query *easily*. This form should contain some such statement as: 'This request is sent to you on the assumption that you can reply with only a few minutes' expenditure of time. If this is not so please return uncompleted form which will indicate that you consider the question not within the scope of this scheme'.

Mr J. C. R. Yeats (Rowett Research Institute) referred to earlier speakers' advocacy of discarding or at least not indexing the apparently irrelevant. He himself was haunted by the fear of rejecting the work of another Mendel (whose paper remained unrecognized for thirty-five years—and only three out of the original forty reprints were still known to exist). He felt that when in doubt one should keep, even though this added to the cost of the service.

Mr G. Burger (Castrol) raised the difficulty of the director who had heard of an interesting title and demanded to see the paper immediately.

The Chairman remarked that it was always possible to ask for another copy if one had thrown the first away, although publishers often did not keep back numbers long.

Mr E. R. C. Lintott (*Daily Mirror*) said that the waste paper problem was familiar to newspaper librarians. A simple answer was to retain material of doubtful value loosely classified chronologically and to discard at intervals. An important aspect of the professional and clerical duties problem was training. In newspaper libraries there were few professionals and, due to the specialized nature of the work, most of the staff had to learn on the job.

Mrs N. F. Wright (Central Electricity Generating Board) referred to Mr Biske's suggestion of standardized loan forms, and put forward the idea that Aslib could give small libraries practical help by the design of a multiple form that could be used as a loan request in the library and passed to external libraries for satisfaction, without the time-consuming intermediate operation of transferring the request to one of the diverse forms now required by various lending libraries.

ORGANIZATIONAL NUCLEI AND INFORMATION CATALYSTS

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Paper presented at the 41st Aslib Annual Conference, Harrogate, 9th–12th October 1967

IN listening to Miss Thornton and Mr Whitehall we have considered some of the ways by which the traditional activities of an information service need a modified approach in the context of the smaller departments. I now wish to look at certain aspects of these activities and forecast the changes in emphasis that will be required in the light of future developments.

Indexing Services

In practice the majority of small units spend a large amount of their available effort in indexing. In many instances this may amount to 75 per cent or even more of their effort. Whereas this amount of intellectual activity is justified in the case of a professional indexer, the small unit cannot afford such a commitment to the storage of references whose relevance to future inquiries can only be guessed, and in practice many of such references will never be required.

Traditionally, training of information workers includes an examination in depth of various retrieval techniques, particularly such systems as feature cards, hierarchical- and thesaurus-based systems. It is hardly surprising that in some circles indexing and retrieval are regarded as universal solutions to the so-called information explosion, nor is it unexpected that a self-perpetuating situation arises where the favourite scheme of a lecturer is passed on to one generation of students and transmitted as nearly ideal when in turn that generation begins to lecture. I suggest that it is this emphasis on retrieval methods during training that can lead to the 'one man' of a small service tending to worship the god of retrieval methods as he slaves away in his monastic cell.

If asked to outline his activities the individual, in showing how he conducts his 'one-man jazz band', will cite other activities he considers necessary to the healthy functioning of his service. Clearly such aspects as SDI, current awareness bulletins, library administration, etc., are a part of his function, but all too often the time allocated to indexing is disproportionate.

The situation outlined can be justified if the individual is employed as a documentalist or paper-keeper. Industry and other employers are more likely to require answers to inquiries, and such answers need to be pre-digested and presented in a readily-assimilated form. That is to say the answer to an inquiry is preferably in the form of a written opinion backed up by abstracts collected from a stated list of sources which can be examined by the inquirer if the opinion is unacceptable, rather than a mere pile of books and journals.

The requirement of most of our British management to have inquiries rapidly and succintly answered is met by appointing the right man and giving him access to the right sources.

The right man

In the context of the small information unit we have seen that the requirement is for a variety of skills which can be applied to the relevant interests of the particular employer. This entails not only a knowledge of the skills but a deep knowledge of the subject field.

This need for experience inevitably means a higher salary. Industry that already has an information unit tends to promote to senior posts from within and this is leading to a shortage of people with experience appointed to establish the new services. Similarly when taking the decision to set up a new unit, management frequently adopts the position of 'We will appoint at a level of about £1500 and see how it goes'. Yet it is in these new posts that the widest experience is required and, as the establishment of a new service needs a lot of hard work, again the higher salaries should be paid. Perhaps this thinking can be adopted by Aslib when indicating to employers the type of person required, by explaining that it is a false economy to appoint someone with less than the widest possible experience.

Right sources

If we accept that the initiator of a new service will spend most of his time answering inquiries rather than dealing with paper, his employers must grant him access to the right sources. If he has insufficient time to engage in much documentation as opposed to information work he will require outside sources. It is here that I see the greatest changes taking place.

In the same way that most firms in Western Europe are 'small or medium-sized', so also are information units. It will become increasingly necessary for outside sources of relevant information to be provided. Such resources will be available in one of two ways, one or both of which will be used depending on the particular inquiry.

Firstly there will be collections of journal references, patents and trade literature for which there will be a regional- or subject-orientated centre, and secondly, in the particular subject field, there will be an increasing dependence on the network of contacts that is already a vital part of information work. The individual will of course hold his own collection of internal reports and for this material he will be justified in spending indexing effort.

The larger collections in the regional or subject centres, which might be termed the organizational nuclei, will provide both the SDI services and the retrieval facilities for the industry as a whole. These retrieval facilities are likely to be increasingly computer-based and OSTI is encouraging the establishment of banks of computer tapes. There is an interesting proposal currently under consideration that the various Research Associations should establish an OSTI-supported SDI service which, because it is over a narrower subject field than say the Chemical Abstracts Service at Nottingham or Medlars, will

have a much higher subject orientation and will be able to cover the technological information which currently tends to be conspicuous by its absence.

Whereas computer-based services can give rapid access to relevant papers, it should be remembered that the smaller the number of references retrieved the higher the proportional cost per reference. It is doubtful that computer tapes are likely to be used *per se* for finding a small number of references known to exist, but rather that computer print-outs will be used, possibly as a KWIC or KWOC type index. It is unlikely that traditional card indexes will be maintained in these organizational nuclei as once the computer tapes are generated it is very cheap to obtain a print-out of the tapes.

Here then is a situation where both the individual firms and the organizational nuclei must refrain from traditional indexing at great length, the individual firm merely indexing its own internal material. As Cole and Brockis have pointed out recently,[1] duplicated research is costing this country about £25 million each year—what is the value of our own duplicated effort, we who are partly employed to prevent such duplication in our own organizations?

Although there is little doubt that in the future the computer will contribute a vital part to the dissemination of information, the present methods leave much to be desired. Recently at the Cranfield International Conference on Mechanized Retrieval, Lesk reported that there was no significant difference between searching titles, titles with abstracts or titles, abstracts and full text. In contrast, the results so far available from Kent's SDI experiment with Chemical Abstracts Chemical Biological Activities (CBAC) and Chemical Titles (CT) seem to indicate a higher relevance with abstracts (CBAC) than with titles (CT) alone. Clearly there is considerable work to be carried out in this application of computers. None of the researchers in the application of computers to retrieval and dissemination are satisfied they have solved the problems and I would not wish to suggest that, because I have mentioned the future use of computers in these regional and subject centres, development work should cease.

The computer has arisen from the calculating machine and is currently best applied to purely computational problems. Language, and therefore technical information, is not capable of a mathematical treatment, although the work of Hillman at Lehigh University on the mathematical relationships between various concepts in a text may prove to be a major breakthrough. One must have sympathy with the various computer firms who must balance their development budgets between improving systems for the highly lucrative and relatively readily handled arithmetically-based data and the more intellectually challenging area of computer applications to linguistics.

Information catalysts

We have then the need for a type of information officer who will have knowledge of his sources, who will not have a documentalist's approach and who will be well-versed in his company's subject field. Such a man is partly equivalent to the Company Technical Adviser who tends to be a senior scientist capable of advising top management of the implications to the Company of new discoveries and techniques. The existing Technical Advisers are in general weak on in-

formation techniques and will not be able to take full advantage of particular computer services. For this reason I propose to call the new breed 'Information Catalysts' as they will plug into a network of contacts in telephone operator fashion far more than the Technical Adviser.

Such a shift in emphasis will require a changed outlook in the training syllabus for new people coming into the profession. As information work becomes further established as a profession there will be an increase in the number employed, both as a result of the employers feeling the need and as a result of the publicity generated by various professional organizations attempting to secure better status for their members. This increase is currently about 8 per cent per annum according to Edwards.[2]

As our Information Catalyst for the small information unit is defined as being someone with considerable experience, it follows that there must be an early change in training so that our successors of ten years hence may be in a position to incorporate these ideas.

An area of training often omitted is the approaches to be adopted in acquiring contacts so that there may be access to a useful network. In addition to the access to specialists via the list of Aslib members and similar directories, there is a need for personal contacts. Many of you are here at Harrogate, not to listen to the papers, which are perhaps provided as justification to management for attendance at the Conference, but to renew old acquaintanceship and make new contacts. The best Conferences provide a delegates list before the event so that you may know which of your friends have changed their jobs since you last met. This list should be primarily used to select those you wish to talk to, but rather than select the individual's name try to select those organizations you feel may be of use in the future. Having selected these contacts it is fairly easy to find an excuse to make yourself known; after all he also needs you as a future contact.

Enlightened management will encourage attendance at conferences in order to maintain contacts. The benefit of sending more than one delegate from the firm is likely to be related to the number of new contacts needed. If you are prevented from spending all your time on the conference circuit and others from your organization attend, try to obtain a list of the new contacts made by your colleagues and keep a 'register of Company contacts'.

One final point regarding personal contacts. The information worker who has worked in different subject fields is more likely to be able to cope efficiently with the inquiries on the fringe of a particular firm's activities, and it is these fringe subjects which often cause most trouble. Here again we have the situation that the wider the experience, the more valuable the appointee to a small unit. The man who has always worked in the same subject area as his firm's activities is only doubling for one of his non-information colleagues who has the required subject expertise.

Summarising, I suggest that individual information units will avoid indexing anything but their own internal material; that greater reliance will be placed on computer-based regional- or subject-orientated services; that traditional indexes held by such orientated services should be converted to OSTI-financed mechanized systems with particular emphasis on technological services and

that finally there is an immediate need for a change of training syllabus for information workers to encourage the telephone operator approach of plugging into the right network or terminal.

REFERENCES

1 COLE, P. F., *and* BROCKIS, G. J. Evaluating the technical information function. *Chemistry in Britain*, 1967, 3, (10), 421–3.

2 EDWARDS, A. P. J. National survey of staff employed on scientific and technical information work, *J. Doc.*, 1966, 22, (3), 210–44.

DISCUSSION

Mr A. R Dodd (Porous Plastics) said that Mr Stern's 'Organized nuclei' providing specialist services to industry were not just castles in the air. The first of them in fact was already being formed. A link-up between the co-operative group scheme based on the Essex County Technical Library at Chelmsford and Indata Ltd (who are attempting to establish a commercial SDI service for products in the electronics, automation and instrumentation field) has resulted in the formation of a unique service of great potential value to the smaller information unit.

In operation, the headquarters library would place one subscription for the full Indata Service and hold all the master cards on file. Any industrial organization could then, for a very nominal charge, receive direct from Indata a regular computer print-out of their individual interest profiles on an SDI basis. Thus the usual arrangement whereby companies would normally place individual subscriptions and have personal interest profiles for certain personnel within their own organization has been magnified to work on a regional scale, enabling small organizations to enjoy the main benefits of the service at a nominal charge. Mr Dodd concluded that he would like to see the same co-operative attitude adopted by all special services, so as to establish an information network that anyone could plug into at an economic rate.

Miss D. R. Dawson (Rubber and Plastics Research Association of Great Britain) asked how Mr Stern considered the OSTI-supported SDI services he described would operate, and whether he visualized retrieval mechanisms being associated with them.

Mr Stern replied that the aim was to prevent the present duplication of effort and improve efficiency. The research associations were an example of an existing service which could be expanded as part of a national network, although membership and commercial difficulties would have to be solved. OSTI at present avoided giving grants which cut across commercial services. If the commercial service was less than ideal, was this policy correct? People should make their requirements known, particularly through Aslib.

Mr A. Gordon Foster (The City University) stressed that at the City University MSc course students were trained to make contacts, use the telephone and go to conferences. Their subject field was expanded by deliberate tests of searching in fields other than their own, and they were taught the value of computers and other mechanical aids.

Mr F. Liebesny (British Aluminium Co Ltd) pleaded for some more information on failures in computer projects, such as the abandonment of the computer information retrieval project by the American Society of Metals.

Mr T. N. Shaw (Unilever Ltd) said that the natural outcome of applying the systems approach and the multiple use of original records to Mr Stern's regional centres and the easy use of outside resources by small information units would be for the centres to produce their output of notification and references on NLL request forms or in a form which the NLL would accept.

THE BRIDGE INDEX: AN EXERCISE IN CURRENT AWARENESS

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Paper presented at the 41st Aslib Annual Conference, Harrogate, 9th–12th October 1967

IN many areas of scientific and technological endeavour there is vital need for rapid access to developments reported in the recently published literature. In particular, pharmaceutical and medical research, and certain areas of the plastics industry are examples of fields where new developments may affect lines of work.

It is appreciated that there are some disciplines where the need for 'current awareness' is not so pressing. For these workers, the abstracting literature may well suffice to keep one abreast with the trends in one's particular area of interest.

This paper discusses the development of a current awareness service in a special library. In devising it, we visualized a 'self-service' approach to the problem in that the inquirer would be encouraged to use the index himself, and to regard it as an extension of the published abstracting literature.

The service is based on a weekly information publication (the *Weekly Survey*) which includes notices of accessions to the library, a calendar of meetings, lectures and exhibitions, titles of internal reports, notes on items of technical and commercial interest, and, the main section, abstracts from the week's intake of scientific and technical periodicals and the patent literature. The abstracts are brief and indicative, and are intended not as a substitute for reading the original, but as a guide to it. Readers are encouraged to ask for the original material.

When the *Weekly Survey* was first published seventeen years ago there were considerable delays in the appearance of references in the main abstracting literature and publication of indexes was frequently delayed for periods of two years or more. During recent years there has been a major advance in methods of publishing the scientific literature and in methods of access to information. The use of the computer and of photolitho offset methods are but two factors which are already having their effects. The gap between the appearance of a paper in a primary publication and reference to it in the abstracting literature has narrowed considerably. More important, indexes are being published more rapidly.

Some three years ago we reconsidered our methods of information storage and retrieval in the light of these improvements in the abstracting literature. Hitherto, we had based our system on a permanent collection of abstracts on 6 × 4 inch cards, classified by a modified UDC system. Cards were prepared either by typing the abstracts from the *Weekly Survey* or by cutting up the

current issue of the *Survey* and gumming the abstract on to the card. The later stages of checking, classifying, and cross-indexing were usually undertaken by the librarian or his assistant. Over the years we accumulated a collection of some 150,000 cards covering a wide range of subjects.

A survey of the abstracting literature to which we subscribed, including *Chemical Abstracts, Index Medicus, RAPRA Abstracts* and *Shirley Institute Summary of Current Literature* showed an almost complete coverage of the literature in our fields of interest. We therefore decided to restrict our own abstracting to the interim period between the primary publication and its appearance in the indexed abstracting literature.

Experience has shown that the abstract cards need not be kept for more than two years, after which time the bulk of them are thrown away. We do, however, maintain a permanent bibliography on a few subjects important to us where the information is required quickly. Thus, the new system which we termed a 'Bridge Index' is intended to bridge the gap between the indexed abstracting literature and the current literature. It is based on a keyword system and maintained in annual sections. We prepared a thesaurus with simple provisions for updating. As with most industrial research organizations, we have a wide range of interests, which are subject to changes over the years. In the main, the thesaurus uses a number of wide terms, such as 'Enzymes', 'Polymer', 'Surgical Dressings' which can be sub-indexed as the year progresses. Thus 'Enzymes' may be sub-indexed, if necessary, 'decarboxylases', 'esterases', 'transaminases', etc.

In order to provide a system which would need the minimum of intermediate preparation we next redesigned the format of the *Weekly Survey*, which had hitherto been produced on quarto-size paper. This was changed to a 10 × 9 inch paper which, by ruling the pages into six divisions each 5 × 3 inches enabled us to print six abstracts to a page, each in a 5 × 3 inch division.

We had installed a 'Multilith 55' some months previously and the suppliers were able to provide the master plates already ruled with the lines marking out the six divisions. This simplified the job of typing the abstracts on to the plates.

When the current edition of the *Weekly Survey* has been printed on the 'Multilith' machine, the operator runs off an edition of single-sided copies on card. These are then guillotined; the dividing lines of the divisions provide guides for this operation. Since the system is disposable, in that most of the abstracts will be discarded after two years it is not essential to print them on card. We experimented with a set of abstracts reproduced by ordinary duplication methods on good quality duplicating paper and found that they stood up to being handled and shuffled around over a hundred times without undue wear. This is far more handling than they are likely to receive in actual practice.

The cards are then ready for filing under the various concepts. Keywords are underlined or added; a fibre pen is useful for this job. We find that an average of four to six cards are required for each reference. Occasionally we need more copies, and these are easily obtained by photocopying one or more of the original cards.

Guide cards, first alphabetic, then concept are added as required. Cross-reference cards are used liberally. We found that by using a coloured card and

a fibre pen, one can produce distinctive cards that can also be easily retrieved when the annual index has to be discarded.

In order to make the process of filing the cards as simple as possible we experimented with the use of trays 24 × 15 × 4 inches, subdivided into four divisions, in place of the conventional card-index files. We found that two or three of these trays hold a year's supply of cards. More interesting, however, the graduate staff prefer to use the trays rather than the conventional files.

At all stages of the project we worked closely with the laboratory staff, first in planning the thesaurus, and later by holding a seminar on the use of the 'Bridge Index'.

The main advantages of this system are as follows:

(*a*) It provides rapid access to items of interest in the current literature, which we find is the most frequently consulted. Without some such system much time can be wasted in searching in the jungle of unindexed literature.

(*b*) The system is simple to organize, and from our own experience to date it should be useful in the small information department that simply does not have the time or staff to manipulate elaborate systems.

(*c*) The method of production ensures that once the typed master plates are checked, as many copies of the abstracts as are required can be made without further checking.

(*d*) The user does not need to understand a classification or coding system in order to consult this index. It is a simple alphabetic index, based on terms which are familiar to him. He can use it with minimal instruction.

(*e*) Cards can be supplied for the subject specialist's individual file, or for duplicating all or part of the index at another location.

(*f*) We have found that the index introduces an element of 'browsability' in that our thesaurus rules group the major part of like subjects together. It also serves as a useful control check on whether a particular paper has been noticed in the literature.

I acknowledge with gratitude the help of my colleagues in the planning and preparation both of the 'Bridge Index' and of this paper. I would also thank the Board of Smith & Nephew Research Ltd. for permission to publish this paper.

THE POWER GAME: INFORMATION BULLETINS FOR THE CENTRAL ELECTRICITY GENERATING BOARD

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Paper presented at the 41st Aslib Annual Conference, Harrogate, 9th–12th October 1967

BEFORE discussing in detail the range of information bulletins issued by CEGB Information Services, I should like to give a few details of the structure of the British electricity supply industry.

The Electricity Act of 1957 transferred responsibility for the generation and main transmission of electricity to the CEGB from the original Central Electricity Authority. The principal duty of the Board is to develop and maintain an efficient, co-ordinated and economic system of electricity supply in bulk for England and Wales and to provide bulk supplies to the Area Boards for them to distribute. The Board's undertaking is organized in five Regions to whom authority for the management and operation of power stations and transmission systems in their areas is delegated.

The Board's headquarters in London has thirteen departments[1] and is the location of Information Services, which form part of the Secretary's Department.

Research and development within the Board is administered from headquarters and carried out at laboratories located at Leatherhead in Surrey, Marchwood near Southampton, and Berkeley in Gloucestershire. The five regions also have laboratories where some research work is combined with their major function of providing scientific services at the work-points of the industry, e.g. at power stations in the fields of chemistry, metallurgy and non-destructive testing. (I have not attempted to give an exhaustive account of the research activities of the Board; a general review of current work is given in the Annual Report and Accounts published by HMSO in October each year.[2])

Four project groups are responsible for new construction; three of them for new power stations and associated substations and the fourth for the primary transmission network. The total number of employees in the industry in March 1967 was about 80,000, of whom 13,600 were technical and scientific: there were 226 power stations in operation and nearly 10,000 miles of high-voltage transmission line.

Thus any current-awareness service must cater for a readership that is not only dispersed geographically, but also varies from practising power-station engineers or chemists to specialist laboratory scientists and management in headquarters' and regional offices. The tasks of the service then are twofold: to secure an adequate vertical dissemination of published information by means

of conventional abstracts bulletins, and, equally important in any large organization, to achieve a satisfactory horizontal flow of information provided by internally produced documents such as research reports.

The basic problems of communication in organizations such as the CEGB have been surveyed recently[3] by the Head of our Information Services and are outside the terms of reference of this talk.

I should like to deal first with abstracts bulletins, and I think it is obvious that the supply of information to staff with such widely differing interests cannot be achieved by means of a single bulletin without its becoming too long to read quickly and expensive to produce and distribute.

The power station engineer is interested in raising the efficiency of the generators he attends by improved methods of cooling, the station chemist needs to have details of new methods of water analysis, and the accountant at an Area Board wishes to know of the current developments in computerized methods of preparing bills for consumers. In an attempt to cover such diversity of interests, our dissemination of information is split into three distinct layers. The first layer takes the form of a broadbrush treatment by the publication of a monthly bulletin of abstracts which is circulated widely throughout the industry. This bulletin, known as *Digest,* covers both English and foreign-language periodicals in subjects dealing mainly with the generation and transmission of electricity. Emphasis is usually placed on operational matters.

About 1,800 copies of *Digest* are printed and distributed throughout the United Kingdom and overseas. This publication is also available on a subscription basis to organizations outside the electricity supply industry.

In addition to abstracts of the technical press, a selected list of published translations and a diary of conferences and meetings of possible interest to CEGB staff are included. One additional feature of this publication which has proved of interest is the inclusion of abstracts of all papers published in the open literature by CEGB authors. This section of *Digest* has helped the horizontal flow of information which I referred to earlier and helps to publicize some of our research achievements.

Digest therefore is the most widely circulated of the three categories of information bulletin which are produced. I now wish to mention some supplements to *Digest* which have the objective of preselecting information on specialized subjects. There are five of these supplements and they are published at approximately monthly intervals.

1. *Gist.* This bulletin was started in 1961 and contains abstracts from the literature dealing mainly with constructional materials (e.g. metals, plastics, ceramics, reactor materials, etc.) and their properties and treatment (e.g. creep, fatigue, welding and stress analysis, etc.) It is distributed widely throughout CEGB research laboratories and project groups. This bulletin is not available to the public since it often contains abstracts of confidential reports received through membership of Research Associations.
2. *Nuclear health and safety.* Because of the steady growth of the number of nuclear power stations in recent years, it was felt that the health and safety aspects of such plant were of sufficient importance to warrant a separate

publication of abstracts from relevant literature. This bulletin contains items selected from *Nuclear Science Abstracts* and other sources. It is distributed to health physicists both at headquarters and at nuclear power stations.

3. *MHD.* We live in an age of acronyms, and this particular example is expanded into magnetohydrodynamics. MHD is a method of generating electricity without the use of rotating machines and when fully developed it may have potential as a means of improving the overall efficiency of generation by its use as a 'topping unit' in a conventional power station. In essence, the method of generation consists of burning a suitable fuel to produce a jet of very hot ionized gas. This jet flows past electrodes which are placed in a strong magnetic field. An electric current can be collected from the electrodes and the exhaust gas, which is still at a very high temperature, is then used to heat a conventional power station boiler. By this two-stage process, the overall thermal efficiency of generation is increased. Research into the practical application of the method is being carried out by the CEGB, mainly at our Marchwood Engineering Laboratories. A bulletin of abstracts on the literature on this topic is produced for these research staff, and the related aspects of plasma physics and high magnetic-field production are also included.
4. *Computers and Control.* It was realized in 1965 that the increasing use of computers and their applications was sufficient to warrant the preparation of a separate bulletin dealing with these subjects. Because of the obvious applications of computers to the control both of individual items of power plant and of large supply networks, abstracts on these topics are also included. The emphasis is on less familiar sources, e.g. dissertations and US government reports. This bulletin is produced jointly with the Electricity Council, who scan the literature dealing with data processing and its commercial applications, mainly as these affect the Area Electricity Boards.
5. *Superconductivity.* This physical phenomenon concerns the disappearance of electrical resistance in certain conductor materials when they are cooled to very low temperatures. The principle has possible applications in the design of power cables and transformers which would operate without losses due to resistive heating. This topic was originally covered by the *MHD* supplement which I referred to above, since the principle of superconductivity can be applied successfully to the design of a compact electromagnet to produce the high fields necessary for MHD generators.

   However, it is now the subject of a separate research effort and this has justified its coverage by a separate information bulletin. The subjects covered include superconducting materials and applications, together with the associated aspects of the properties and handling of the very low temperature liquified gases which are used in superconductivity research.

I hope it is obvious that the bulletins just described are produced to meet the literature requirements of particular groups of engineers and scientists working within the CEGB. The system by which the material for inclusion in all our bulletins is selected is simple and therefore flexible, so that if the need for

information on a new topic arises, a separate bulletin could be produced within a fairly short space of time. An example is the bulletin on superconductivity just mentioned. The scanning of periodicals and reports is a co-operative effort within the information section. Subject-qualified information scientists assume responsibility for drawing the attention of bulletin editorial staff to literature which they know to be of interest.

There is one further aspect of the active supply of information which I will now mention and this concerns our selective dissemination programme. A modest system was started in 1962 serving research and development staff and this has gradually been extended to other departments. A total of 223 people (mainly section heads or at a similar level) are direct recipients; the actual number served is greater than this since the bulletins are usually circulated within the sections.

The participants are asked to mark on a list of eighty subject headings those categories on which they wish to receive information. The single-sheet bulletins, known as *Specific Information Circulars,* are distributed weekly. Each sheet usually contains a maximum of three abstracts, and a simple peek-a-boo system is used by the distribution clerks to despatch these sheets according to the subjects for which abstracts become available in any particular week and the categories which the recipients have asked to receive.

I have not mentioned various supplementary bulletins such as lists of library accessions and reports, since these are standard production items in most information sections or libraries. However, the internal communications link within the Board is served by two other publications: a monthly list of reports (both internal and external), and information summaries, which are short articles outlining important scientific or technical developments by CEGB staff and are aimed at potential users of such developments. An indication where more detailed information can be obtained is given.

One interesting way in which the existence of information services has become better known to many of the staff has been the adoption of a common layout and colour for all of its information bulletins. Most of them are produced by the use of tape-typewriters: I will not go into the mechanics of production, since this topic has been dealt with by one of my colleagues in a recent Institute of Information Scientists paper.[4] Indexes for these bulletins are not printed: all items abstracted are classified by subject using our own thesaurus of terms and held in a central card index: additional material for possible future use is also indexed in the same way.

Such a range of information bulletins could not be produced, indexed and distributed without the active participation and willing co-operation of a number of information scientists, library staff, typists and clerks. I hope that the pattern of information dissemination which I have drawn will perhaps give some of the audience at least one idea or two in which they can improve the flow of information in their particular organizations, large or small.

This paper is published by permission of the Central Electricity Generating Board.

NOTES AND REFERENCES

1 These are as follows: commercial, finance, generation design, nuclear health and safety, operations, personnel, purchasing and contracts, planning, research and development, secretary's, services, solicitor's and transmission.

2 CENTRAL ELECTRICITY GENERATING BOARD. *Reports and accounts for the year ended 31st March 1967*. London, HMSO, 3rd October 1967.

3 COLINESE, P. E. The role and value of an information department. *Bull. I. Inf. Sc.*, vol. 5, no. 2, 1966, p. 13–18.

4 VICKERS, P. H. Tape typewriters: practical aspects of their use in information work. *Information Scientist*, vol. 1, no. 1, July 1967, p. 17–32, 32–4.

DISCUSSION

Mr G. Glaser (Morganite Research and Development) said it seemed a waste to throw away an index, as Mr Brown did, once the information became available in commercial abstracts sources, since 1. the index was bound to contain references to, e.g., trade literature and news items, none of which were retrievable from outside secondary sources; 2. the index was already organized in a form well known to Mr Brown's users and therefore the information remained quickly accessible; and 3. if the choice of the primary sources was right in the first instance, the index should contain a very large proportion of information likely to be needed, and searches of abstract journals (e.g. *Chemical Abstracts*) were thus only necessary to cover marginal interests. Had Mr Brown considered storage of the older indexes on microfilm?

Mr Brown replied that he had considered this. His organization did research on pharmaceuticals, where current information was vital and the Bridge Index helped here. But in three years' time almost everything it contained would be common knowledge and accessible through *Chemical Abstracts*, along with a good deal more information which had gone unnoticed. It was dangerous to rely on one's own indexing in such a case.

Dr D. J. Campbell (Pressed Steel Fisher) said he disagreed with the idea of getting users of the service to decide on how subjects should be indexed, because they could see only their own point of view, never that of the whole organization. The information officer should himself know the terms used by the specialists. He had tried what the speaker suggested, but had nearly always regretted it.

Mr Brown replied that users who suggested impossible terms were gently persuaded that these were unsuitable. The system helped to achieve co-operation.

Mr J. G. Hall (Esso Petroleum Company) suggested that one of the librarian's functions was to eliminate the prevailing uncritical reverence for printed material; there was a sense in which the waste-paper basket was the librarian's best friend. While Miss Thornton had emphasized the importance of selectivity and a critical outlook in the processing of information, it was equally important that a critical selectivity be exercised in the processing or shaping of reader's inquiries. So often in their original form these did not indicate exactly what was needed. If answered exactly as presented the inquirer might well be discouraged and the librarian involved in unnecessary work. Finally, Mr Whitehall advised a critical examination of the librarian's activities in order to make available time to think; he also needed time to make himself more directly accessible to his clients.

Mr M. W. Hill (National Reference Library of Science and Invention) commented that the National Reference Library of Science and Invention took as many company-produced information bulletins as could be acquired, and shelved them among the abstracts periodicals, which they supplement. The length of time each was held depended on whether it was superseded by the indexed abstracting journals or whether the information bulletin drew on a source not otherwise covered. In the latter case copies were retained for ever; in the former they might be discarded after a few years.

Mr E. D. Wiggins (Fisons) asked how Mr Prior selected items for inclusion in his General Bulletin (Digest) from the presumably voluminous literature on electricity.

Mr Prior replied that he selected from the relatively restricted field of the operating problems of generation and supply all that was relevant to the interests of the Central Electricity Generating Board.

Mr J. G. Hall (Esso) remarked that under the stress of the information explosion far too many workers were looking for an excuse for not keeping up with the literature; it was important not to provide the straw that breaks the camel's back.

Mr J. R. Sharp (ICI Fibres Ltd) said that Mr Prior had described bulletins representing three levels of selectivity; one (the general bulletin) with none at all, a second based on subject group interest, and a third directed at individuals. Did his experience point to any conclusions on the wisdom or otherwise of adopting a Selective Dissemination of Information system? Was the task of reading a general bulletin so onerous to the individual as to necessitate SDI, with its risk of missing items of interest?

Mr Prior replied that there were 6,200 engineers and scientists in Central Electricity Generating Board, so that the cost of an SDI system for each one individually would be very high. There was no point in including special subjects in the general bulletin; the special bulletins were for this.

Miss M. D. Gauntlett (Kodak Ltd) asked whether Mr Brown had considered using titles only instead of abstracts in the Bridge Index? This might reduce the intellectual effort involved.

Mr Brown replied that many papers gave no clue in their titles of vital information they contained incidentally. In his system titles alone would not be satisfactory.

Mrs G. E. Taylor (Zinc and Lead Development Association) said that readers of her two monthly abstracts journals would be most dissatisfied with titles alone, since these could be quite misleading (e.g. the title 'Hot stripper removes everything' referred to a paint stripping compound).

Mr V. Biske (Burmah Oil Trading) said that one way out of the difficulty was the method used in legal literature. Comment has been made on mere title index entries as against indicative abstracts. We could take a leaf from legal literature. Law reports included, as a form of index, a very brief digest consisting of key words and phrases, without attempting sentence construction. A typical example (taken from [1954] 1 WLR xxxv) was: 'TRADE MARK—Registration—Distinctiveness—Geographical name—Whether inherently adapted to distinguish—"Yorkshire" copper tubes—Trade Marks Act 1938, s.9.

Yorkshire Copper Works Ld v Registrar of Trade Marks.
H.L. (E) 1 W.L.R. 554'.

ORGANIZING AND PLANNING SIRAID AND OTHER SERVICES OF SIRA'S INDUSTRIAL COMMUNICATIONS GROUP

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Paper presented at the 41st Aslib Annual Conference, Harrogate, 9th–12th October 1967

THE purpose of this paper is to describe a simulation approach to the management of information and library services. The technique is being developed to aid in organizing and planning Siraid and other industrial communications activity at Sira (British Scientific Instruments Research Association). To put this work in context it will be helpful to indicate the nature of this activity and its relevance to the current functions of Sira.

Sira functions

In most people's minds the concept 'scientific instrument' conjures up an image of laboratory observation or measurement procedures. It is true that the use of instruments in education and research gives an important sales outlet for scientific instrument manufacturers. But in recent years industry has been buying more instruments. In industry manufacturing processes are becoming more complex and more difficult to control. Competition is creating pressure for lower costs and better quality and reliability of products and therefore a need for closer control. Instruments are being installed on production lines to control important variables in manufacturing processes. The use of the measurement and control data from instruments in integrated automation systems has lately been attracting considerable attention in the UK.

It is in the field of industrial automation that a significant part of Sira's activity now takes place. This work is customarily undertaken in partnership with other industrial research associations. It is financed both by industry and by the Ministry of Technology. For work on automation Sira obtains a Ministry grant of 300 per cent on industrial contributions. The financial support is to help accelerate the introduction of automation in British industry.

This responsibility for stimulating innovation can be regarded as essentially a transfer problem. Opportunities for applying knowledge of measurement and control profitably in industry need to be identified. The relevant science and technology then has to be communicated by means which actively encourage adoption of innovation by industry.

'Profitably' is a key word. To quote Sir Solly Zuckerman: 'The primary purpose of the research and development which is carried out by or for manufacturing industry is not to increase the body of scientific knowledge, but to secure and to maintain a high rate of productivity through technical innovation

and eventually to make greater profits.'[1] It is of interest in this connection that there is a body of research by American economists which suggests that technological progress accounts for as much as 90 per cent of increases in output per man-hour as compared with 10 per cent for new capital formation.[2–4]

Communications policy

From an economic point of view it is important to concentrate on the communication of research and development results which can be implemented by industry. Communication implies not only creating awareness of new technology but also taking action to facilitate its adoption. A communications service has an entrepreneurial role. The raw material in this enterprise is information on relevant or potentially relevant technology. The service adds value to this information by interpreting, evaluating and gaining practical experience of applications of the technology in industry. Success depends on the extent to which the processed and repackaged information matches the manufacturing capabilities and marketing objectives of the companies persuaded to use the service.

The basic objective of Sira's industrial communications group is to increase the rate of adoption of measurement and control science and technology by means of services which assist individual companies to accept innovations generated outside the firm. This is a wide brief. The group provides a range of library, information science, public relations and educational services. It should be emphasized that the activity of the group is not restricted to the retrieval or dissemination of technical information or data—there is an investment of £40,000 a year in the Siraid service which undertakes advisory and consultancy work on behalf of makers and users of instruments and control devices.

Siraid

Siraid, as a national productivity advisory service specializing in automation, receives extra support from the Ministry of Technology. A £15,000 contract has permitted the extension of Siraid so that up to one day's technical effort can be spent on instrumentation and control problems without charge to the inquirer, whether or not the firm is in Sira membership.

In practice this means that the problem can be defined, first by discussion with the inquirer and, frequently, by a follow-up visit to the plant to study the problem on site. The feasibility of the solution proposed as a result of this study will, if necessary, be tested in the laboratory and then communicated to the inquirer.

If additional work is required beyond the one day free limit, this has to be paid for directly by the non-member inquirer. The cost varies according to the importance of the task and the terms imposed by the inquirer. Confidential contract work is charged at full cost; other projects may be grant earning, if the results would be of general benefit to the industry and permission would be given to publicize the work.

Solutions to Siraid problems are techno-economic. Technical feasibility has to be proved. Equally, answers have to make sense economically. In an industry with a usual investment pay-back period of one or two years, new instrumentation, which would not justify its cost in less than twenty-four

months, is unlikely to be accepted, however ingenious the technical application. An industrial concern with a labour-intensive manufacturing process and a short life cycle for its products will be reluctant to invest in capital equipment unless it promises a quick return in terms of cost reduction or quality improvement for a low initial investment. On the other hand, a large, highly capitalized enterprise could well consider an outlay of thousands of pounds to give a marginal long term increase in productivity.

There has been a substantial rise in demand on Siraid. Even leaving aside the volume of inquiries for data on British instruments, and excluding library reference inquiries, Siraid has been handling increasing numbers of requests for information and advice on instrumentation, control and automation problems. In 1964–65 requests of this nature were being dealt with at the rate of forty a month. Last year the number more than doubled and now almost 250 a month are being processed.

The full-time staff of the industrial communications group numbers twenty-nine; two-thirds are graduates or professionally qualified. Resources for Siraid work are not, however, restricted to the staff of the group. Research staff from other Sira groups are brought in when a problem arises to which their specialist knowledge can be applied. Under an arrangement with the Ministry of Technology, Siraid problems are dealt with by scientists from Government research stations; and schemes are being developed to augment available resources by secondment from industry and by contractual arrangements with free-lance consultants.

Preparing the simulation model

The rapid increase in demand on Siraid has coincided with an expansion of other services operated by the industrial communications group. These developments have created some problems in organizing and planning the work of the group. To help with these problems a model has been developed to simulate the group's activities on a computer. The object of the simulation model is to represent the real-life situation in a way which permits experimentation with management policies and procedures. An analogy can be drawn with aeronautical engineers' use of models to test design ideas in a laboratory or wind tunnel.

In developing a simulation model one of the main problems is the collection of data. The data are required to define in appropriate detail the system represented by the model. In the simulation of the communications activity, data on three aspects of the system are needed. The system has come into being because there is a demand. The first task therefore can be the study of *demand,* with the object of identifying important kinds of demand. Secondly, to meet the demand a method of operating the system has been evolved. There is therefore a need to analyze the *operations* of the system in depth. Finally, to work the system, labour *resources* are required and these have to be described within the framework of the computer model.

Taking first the study of *demand*: work at Sira has concentrated on detailing the various kinds of demand on the industrial communications group and discovering the volume and frequency of their occurrence. In categorizing

demands it has been found helpful to distinguish, for example, between inquiries both according to how they are received (telephone; letter; visit) and according to how they are answered (reference to trade literature; reference to technical literature; consultation with specialists; on-site study of the problem, etc.). In effect each category of demand is defined in terms of the operations which have to be completed before the demand is satisfied. At the same time the rate of input of each category of demand has been investigated; this has given data on quantities and frequencies of demand arrival, which form the basis for the computer simulation of demand referred to later in the paper. For each demand a number has been assigned to indicate the priority of the demand in the system.

In distinguishing between different kinds of demand it was found useful to consider the individual *operations* performed by the group in processing each demand. Working out a network of the operations performed by the group was a major task in the research. It involved extensive analyses of the records created and of the work carried out by the staff of the industrial communications group. From this study an overall network showing the sequences of operations in fulfilling demands has been produced. This network is akin to those developed for PERT and similar techniques, but there are differences. A PERT network, for instance, usually relates to one large project exploded into the hundreds or thousands of activities and events which comprise the project. In a simulation model of a communications system there are thousands of mini-projects (the individual demands on the system) each of which is likely to comprise only a few activities or operations.

Nevertheless, just as with a PERT network it is important to arrive at realistic time estimates for each activity in the network, so there is a need in a simulation model to produce standard time estimates for each operation. Arriving at these estimates proved very difficult. Observation tended to affect the time taken for the operation. Eventually, three parallel approaches were used. First, subjective time estimates for all operations were obtained from the staff who actually had to perform them. Secondly, the activity of the group was studied on a sampling basis, with stop-watches used to assist in measurement when this seemed appropriate. Thirdly, members of the research team themselves participated in the group's work to verify estimates obtained by other means on a sample of operations.

The primary version of the simulation model provides for a network of operations with standard time estimates related to each operation. It should be noted that, in this model, work processed outside the group is represented as operations consuming time, but not resources, in other words as delay. As the system represented by the model is subject to change, its operations are continually being modified in points of detail. An attempt has been made to design the network in a modular fashion so that it is possible to take out and alter one section without having to re-plot the entire network.

Describing available labour *resources* in terms meeting the requirements of the model also presented problems. It was decided, at this stage, to use only two parameters to represent the work of a member of the staff of the group on an operation in the system. The first was cost over time; this can be determined

relatively simply. The other parameter (presenting a more difficult problem) is concerned with the efficiency of the resource on the operation, or, put another way, how quickly is it reasonable to expect a particular member of staff to perform the operation in comparison with the standard time estimate. This problem has to some extent been circumvented. Constraints have been introduced which limit certain operations to technical staff and some to typists. Relative speed of operation in each area is then defined in terms of salary grouping. These constraints have been quantified in the form of a matching coefficient. A coefficient of zero indicates that the resource cannot be used on the operation. A higher coefficient denotes the assumed speed with which the operation can be carried out in relation to the standard time estimate. From the cost/time figures and the matching coefficient, the time an operation takes to perform and its cost can be worked out automatically for any possible allocation of staff to operations. The question of appropriate use of staff on particular operations is not taken into account in this preparatory stage.

Using the primary simulation

While data were being collected on the Sira industrial communications group demands, operations and resources, work was proceeding on the computer programs to control the simulation. Programs were prepared in ALGOL for Sira's Elliott 4120 computer. Extensive use was made of methods developed by Sira for work on simulation in the field of industrial production control.

To use the simulation, data on operations are input. For each operation there is a schedule of preceding and succeeding operations and standard time estimates. Secondly, data on available resources are fed in. At this point the user of the simulation (from his knowledge of individual members of staff) adds a further constraint, restricting the operations on which each labour resource can be used at maximum efficiency to those operations for which working experience has already been gained. Provision is also made for the employment of staff on operations on which they have basic qualifications but little or no experience. For these operations it is assumed in the model that a given time would be required to reach maximum efficiency. These facilities have been introduced to simulate real-life limitations on the allocation of labour resources.

Thirdly, the demand data are processed with an off-line computer program to simulate the mix of demands which might be expected to arrive in the system in a typical week or month. The program samples randomly from the frequency distributions of demand produced in the initial study. Typical demand mixes can be produced for as many weeks or months as are required by the simulation user. When the demand mix has been computed for the length of time required, demands are input in sequence at the times they would arise, as predicted by the demand simulation. This information is input automatically and is not available to the simulation user.

The primary simulation uses the computer in its conversation mode. The arrival of the first demand on the system produces a print-out on the user's terminal. The print-out gives a description of the first operation required in the processing of the demand together with a list of the staff who could be used (given the constraints imposed on the model) to carry out the operation. The

data on cost, time and efficiency are printed out against the code number of each labour resource. The simulation user decides which staff to allocate to the operation and types in the operation identification code and the code number of the labour resource. The computer assigns the labour resource to the operation and works out how long the operation will take. Once allocated, staff are not listed as available for allocation to subsequent operations until the operation on which they are working is completed.

The next operation is then printed out on the terminal with a list of possible labour resources and relevant data. This operation might be the second to be performed in processing the first demand, or it could be the first operation for a new demand which has entered the system in the interim. The computer is programmed to select the operation with the earlier time. It makes its choice of operations by checking both a time reference, derived from the demand simulation, as well as the data on time required to carry out operations when an allocation has been made. When operations are scheduled to begin simultaneously the choice is made on the basis of the priorities assigned to each category of demand. If the priorities are also equal the selection is random. The simulation user continues to allocate resources to operations until demands arriving in the period of the simulation are completed.

The computer is programmed to hold operations temporarily in abeyance in three instances: first, when a delay would occur because operations are being performed outside the ambit of the industrial communications group; secondly, when there are no suitable labour resources free to carry out the next operation and, thirdly, when there is more than one preceding operation. In the third instance, preceding operations are likely to be carried out in parallel but have different durations. Succeeding operations have therefore to be held until all preceding operations have been completed. Operations can also be held temporarily on instructions from the simulation user.

What information does the simulation user have in deciding allocations? He knows, in general terms, the demands likely to be made on the system, although he cannot predict, in detail, the volume of demands and when they will arise. He also knows what demands are currently being processed and the operations which still have to be performed on them. He can obtain some further information from the computer, which will produce on request a print-out showing the effects of decisions already made on the processing of demands and the utilization of labour resources.

The print-out analysis gives information on five points: the total time spent by each labour resource on each demand; the total time spent by each labour resource; the total time spent on each demand; the total cost of each demand; and the total time lapsed in processing each demand. This analysis is also produced at the end of the operating period in each use of the simulation. The data give the user some measure of the effectiveness of his allocations and he can calculate such figures as the cost of the system per demand, the proportion of man-hours efficiently utilized and the number and kind of demands processed in the available time.

The primary simulation model of the Sira industrial communications group has been prepared with two short-term objectives. In the first place the dynamic

representation of the group's activity gives management a method of learning about the effects of decisions on the system. Possible configurations of resources can be studied without disrupting the work of the group with constant changes. Secondly, the discipline of formulating a model has been valuable in reappraising the present methods of organizing and planning the group's activity.

As a result of the study of the present system a change has now been made in the organization of the group. Previously, the policy was for one person (as far as possible) to deal with a demand from start to finish, reallocation being exceptional. Now the policy is for one person to specialize in a particular type of operation, demands thus being processed by several members of staff, passing from one to another in a predetermined sequence. It is not yet possible to assess whether or not the modification of policy is bringing about the benefits anticipated.

Further development of the simulation model

Work to take the simulation to the next stage is currently being planned. With the primary model the simulation user makes allocations to individual operations as they arise. But, in practice, a communications activity could not be controlled by a single administrator at such a level of detail. What actually happens is that management defines an organization structure and prepares rules and instructions to which staff are expected to work. The structure and the rules and instructions are a statement of management strategy. Decisions on the interpretation of this strategy are made at the tactical level; staff operating the system allocate their own time to individual operations.

In developing the simulation the objective is to give management a means of working out automatically the implications of alternative strategies. In the primary model data on demands, operations and resources were input. For the later model it is necessary to introduce a further simulation program. This program is to simulate the allocation of resources to individual operations. The development of the program requires a method for describing strategies which might be adopted by the simulation user and which the computer has to be instructed to apply at the tactical level. Two approaches are being used to describe strategies within the framework of the computer model; both techniques involve a study of the significant factors or parameters underlying strategies.

The first approach is essentially deductive. The industrial communications group is considered as an economic unit. Such a unit might have, for example, production, marketing, accounting and personnel management functions. Each of these functions is concerned with a specific activity: information and advice is produced in a form to meet explicit demands from users; latent demand is stimulated by promotional techniques; costs incurred in satisfying demands are allocated; a personnel policy is applied. The management of the unit requires a strategy to reconcile diverse objectives associated with each activity. These objectives could include: fully utilizing production capacity; maximizing demand in the chosen field of operation; minimizing operating costs; and minimizing staff turnover by policies which help ensure job satisfaction. An analysis of this kind suggests certain parameters which could be helpful in defining strategies, as, for example, the proportion of man-hours usefully

employed; the speed of response to demands; the cost of processing demands; and the percentage of time staff are working on operations appropriate to their skill and experience.

The inductive approach is complementary. It involves the detailed study of actual decisions. The aim of the study is to identify factors governing choice of resource in particular situations. It might in theory be possible to examine allocation decisions continuously in the real-life system; in practice, it is much simpler to study the use of the primary simulation model which has been developed for this purpose. By investigating the allocation decisions of the simulation user it is intended to determine relevant parameters which, in turn, can be used to specify possible strategies.

To use the later model, the data on demands, operations and resources are fed in, as in the primary model. The simulation user then feeds in a description of the organization structure and the combination of parameters which represent the strategy he proposes to test. The computer processes these data and prints out an analysis in the same basic form as for the primary simulation. The analysis shows for the operating period simulated in the model the effects of the proposed strategy on the costs of the system, on the processing of demands and on the utilization of resources.

Developing the primary model produced a considerable amount of information which has had an important practical application in the restructuring of Sira's industrial communications group. The next stage of development is expected to produce a refined management aid to organizing and planning library, information and communication activity.

With the later version of the model it should be possible to examine the system more fully. For example, the saturation load can be studied by increasing the processing load while holding the remaining variables constant. Once the saturation point has been reached under a given system state, the problems of raising the system's capacity can be analyzed by holding the increased processing load constant and manipulating the other variables. Thus, it would be possible to examine the effects of recruiting additional staff and to define the qualifications and experience they might usefully possess. The feasibility of increasing investment in retrieval systems could be studied. In the long run, it might also prove practicable to extend the model to assist not only with the organizing and planning, but additionally with the control of the system.

Technology transfer

At Sira some thought has been given to communications policy for the 1970's and 1980's. Briefly, Sira's industrial communications group is now dedicated to the role of specialist information brokers, concerned with achieving the adoption of measurement and control technology in profitable novel applications—in a phrase 'technology transfer'.

As brokers of new technology the group is accountable to its users as agents responsible for seeking out, evaluating and bringing in innovations relevant to the commercial and technical objectives of each user's organization. It is a responsibility which involves social and economic considerations as well as an understanding of the technological background.

Operating a communications service as an enterprise implies marketing objectives. The key to Sira's marketing policy in this field is added value. Even with massive computer banks in the next two decades giving users remote access to information and data, it is expected that there will be an important function for the specialist service at the interface, acting on behalf of the user, interpreting, evaluating, advising and giving practical assistance. By such techniques the service adds value to the original information and thus creates a marketable commodity—processed, specially packaged technology for the user.

In the future, effectiveness will have to be proved either in competition with other services or by cost benefit techniques of analysis. Management efficiency in these circumstances could well be critical. It is in the belief that operational research techniques are likely to contribute significantly to the management of library, information and communication services that Sira has undertaken the simulation study which has been described in this paper.

Notes. 1 The research team has been drawn from Sira's Industrial Communications and Industrial Measurement and Control Groups. Those mainly concerned with the project were Mrs P. A. Shepherd (Industrial Communications Group) and W. H. Simmonds and R. Leary (Industrial Measurement and Control Group, Operational Research and Computer Applications Section).

2 A full account of the research to date is to be given in a Sira research report to be published at the end of 1967.

REFERENCES

1 ZUCKERMAN, *Sir* SOLLY. Science in the arena: report of a Royal Institution lecture. *The Times*, 14th April 1967.

2 SOLOW, R. M. Technical change and the aggregate production function, *Review of Economics and Statistics*, vol. 39, August 1957, p. 312–20.

3 FABRICANT, S. Resources and output trends in the United States since 1870. *American Economic Review*, vol. 42, May 1960, p. 182–8.

4 MANSFIELD, E. *Expenditures of the firm on research and development*. Yale University, 1962. (Cawles Foundation discussion paper, no. 136.)

5 MORAVEC, A. F. Using simulation to design a management information system. *Management Services*, vol. 3, no. 3, May–June 1966, p. 50–8.

6 MCKENNEY, J. L. *Simulation for control*. Los Angeles University of California Western Management Science Institute, 1965, 14 p. (Working paper no. 91.)

7 H.R.B. SINGER, INC. *A general model for simulating information storage and retrieval systems*. Pennsylvania State College 1966, 179 p. (US Government research and development report no. AD-636435.)

8 FREEMAN, D. E. Discrete systems simulation: a survey and introduction. *Simulation*, vol. 2, no. 3, September 1966, p. 142–8.

DISCUSSION

Mr J. R. Stocks (Shell International Petroleum Co.) asked whether Mr Myers had assessed the 'efficiency coefficient' and 'appropriateness coefficient' of his computer as a 'resource' and arrived at a cost?

Mr Myers said the method developed at Sira had the advantage of making it possible to try out variations in a system without disrupting people's work. Without some such method it was difficult to find out what decisions had been made at low levels. The long-term advantage of the simulation method (which made it economic to use), was in defining optimum ways in which resources could be allocated.

Mr D. J. Simpson (Glasgow University) asked how quantities were allotted for input to the system.

Mr Myers replied that modal quantities were obtained from time distributions based on observation of operations. Some 250 consultative inquiries, for example, were received each month, and a quantity estimate was made for each kind of demand.

Mr C. J. Eve (Rolls-Royce Aero Engine Division) asked what size an organization had to be before a survey of this nature became economically viable. What would be the cost of such a survey for a library staff of, say, twenty-two (five translators, ten librarians and the rest clerical staff)?

Mr Myers replied that Sira's industrial communications group employed twenty-nine people; the survey cost £6,000 (including overheads), and it was expected that another £11,000 would be spent. Future surveys by other services might use the Sira programs and thus reduce the cost to that of data collection.

Mr J. H. R. Marns (AERE) asked 1. Why the work was undertaken. Had something gone wrong with Sira's services? 2. Whether the work had affected the speed with which Sira answered queries now. 3. What Mr Myers' efficiency coefficient was.

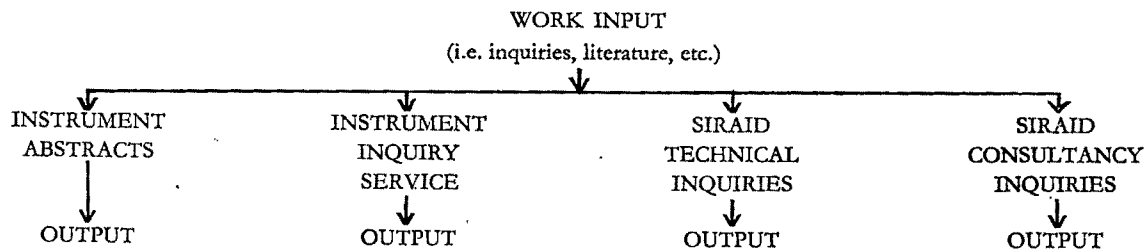
Mr Myers replied that the aim of the study was to anticipate the results of rising demand, so that a high level of efficiency could be maintained, even with a growing volume of work. He had no definite information on how this efficiency compared with that of other organizations, such as AERE. The manager was outside the system, so his efficiency coefficient was not recorded.

Mr C. J. Eve (Rolls-Royce Aero Engines) said the system seemed cumbersome, and described a rack control system in use at Rolls-Royce, whereby mail was sorted and work returned to the rack at each break (lunch, evening, etc.) so that backlogs could not accumulate. This simple system made possible the most efficient use of junior staff and was surely capable of much wider application.

Mr Myers replied that he had not been talking about methods designed to provide information for the control of simple systems—the study was more concerned with organizing and planning a complex range of services in a rapidly developing situation. In such circumstances traditional approaches were inadequate and the simulation technique provided a potentially valuable method of evaluating alternatives rapidly and objectively. Comprehensive control systems could, of course, be used, but this was outside the scope of the present study.

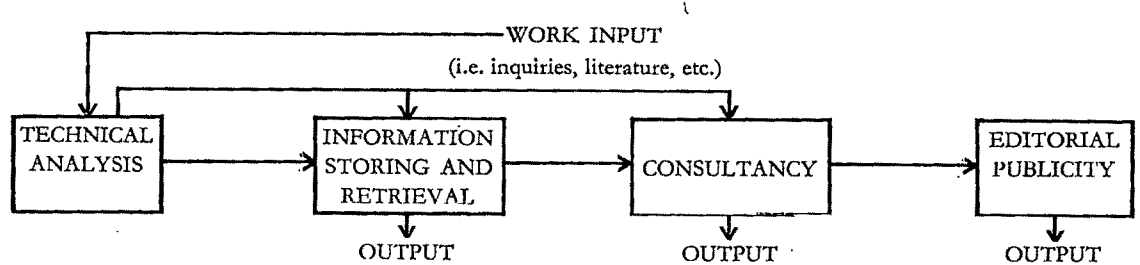
Mr B. C. Vickery (Aslib) asked whether the simulation technique could give guidance as to which functions could most efficiently be combined.

Mr Myers replied that this could certainly be discovered by experiment, although he had no information as yet. This was the sort of question that was being asked.



TOPICAL ORGANIZATION

With this organization all the operations in fulfilling a demand—e.g. answering a technical literature inquiry—are as far as possible undertaken by one person.



FUNCTIONAL ORGANIZATION

With this organization each person as far as possible concentrates on one kind of operation, work passing from one person to another in a predetermined sequence, according to the nature of the work.

SELECTIONS FROM THE RECENT LITERATURE

ALL ITEMS listed may be borrowed from the Aslib Library, except those marked *, which may be consulted in the Library.

Books and Pamphlets

AMERICAN LIBRARY ASSOCIATION. Library Technology Program
Cleaning and preserving bindings and related materials, by Carolyn Horton. Chicago, the Association, 1967. xix, 76 p. illus. $3.50.

AMERICAN MATHEMATICAL SOCIETY
Development of computer aids for tape-control of photocomposing machines: extension of the system of preparing a computer processed tape to include the setting of multiple line equations. Providence, R.I., the Society, 1967. 23, var. paging.

AYRES, F. H., *and others*
The Aldermaston mechanised cataloguing and ordering system. Part 1: planning for the I.B.M. 870 system. [Aldermaston, Berks., U.K.A.E.A., A.W.R.E.], 1967. 6 p. diagrs. (AWRE Library Information Note, no. 67/11.)

BRITISH COMPUTER SOCIETY
Character recognition. London, British Computer Society, 1967. 195 p. illus., diagrs. 32*s* 6*d*.

BRITISH STANDARDS INSTITUTION
Specification for 35 mm. microcopying of engineering drawings and associated data. Part 1: recommended procedures. London, the Association, 1967. 19 p. diagrs. (B.S. 4210: part 1: 1967) 8*s*.

*BURTON, BARBARA, *and* WOOD, J. M., *eds*.
Library resources in Wales and Monmouthshire. London, Library Association, Reference, Special and Information Section, 1967. v, 61 p. 16*s* (members 12*s*).

CASH, GORDON E.
Combinatorial document storage and retrieval. Fullerton, Calif., Hughes Aircraft Co., 1966. 9 p. (AD 647 900).

CHAPMAN, EDWARD A., *and* ST. PIERRE, PAUL L.
Systems analysis and design as related to library operations: a manual for a symposium sponsored by the Upstate New York Chapter, Special Libraries Association, Saratoga Springs, New York, September 17–18, 1966. Troy, New York, Rensselaer Polytechnic Institute, Rensselaer Libraries, 1966. 78 p. tables, diagrs.

CONFERENCE ON LIBRARY TECHNOLOGY, Catonsville Community College, Chicago, Ill., 26–7 May, 1967.
LIBRARY technicians: a new kind of needed library worker: report of a conference. Washington, D.C., Communication Service Corporation, 1967. 28 p.

FLOOD, BARBARA, *ed*.
Three Drexel information science research studies, by Ralph Garner, Lois Lunin and Lois Baker. Philadelphia, Pa., Drexel Press, 1967. ix, 182 p. tables, diagrs. $7.50.

FOSTER, J. M.
List processing. London, McDonald, 1967. 54 p. diagrs. 21*s*.

FRIEDMAN, JOAN, *and* JEFFREYS, ALAN
Cataloguing and classification in British university libraries: a survey of practices and procedures. Sheffield University, Post-graduate School of Librarianship, 1967. 37 p. tables. 10*s*.

GILCHRIST, ALAN
Trade literature. *Technitest Intelligence Report*, April 1967, p. 1–4.

GOLDRING, MAURICE
Typographers prepare for the computer. Reprinted from *The Designer*, nos. 160/161, June–July 1966.

GREAT BRITAIN. Parliament. *House of Commons*
The Library of the House of Commons handbook. London, the House, [1967?] 56 p.
Part I—short description of the library and services offered to members.
Part II—short description of the holding of official publications, books, periodicals, pamphlets, papers, etc., in the Library, 1966.

HIZ, HENRY
Computable and uncomputable elements of syntax. Philadelphia, Pa., University of Pennsylvania, Linguistics Department, 1967. 17 p. (Transformations and Discourse Analysis Papers, no. 69.)

*INTERNATIONAL directory of micrographic equipment, edited by Jack Rubin. Saratoga, Cal., International Micrographic Congress, 1967. [2], 519 p. photos. $12.50 ($10.00 members).

KOCHEN, MANFRED, *ed*.
Growth of knowledge: readings on organisation and retrieval of information. New York, London, John Wiley, 1967. xv, [2], 394 p. tables, diagrs. £5 13*s* 6*d*.

MACKAY, NEIL
The hole in the card: the story of the microfilm aperture card. St Paul, Minn., Minnesota Mining and Manufacturing Co., 1966. 122 p. photos. $1.49.

MCLUHAN, MARSHALL
The Gutenberg galaxy: the making of typographic man. London, Routledge & Kegan Paul, 1967. 293 p.

PURDUE UNIVERSITY. Libraries and Audio Visual Center
The past and likely future of 58 research libraries, 1951–1980: a statistical study of growth and change. Lafayette, Ind., the University 1967. iv, 82 p. tables, diagrs. 3rd printing. Includes statistics of short-term growth. Original statistics, although sometimes over conservative, are usually borne out.

ROGERS, FRANK BRADWAY
Librarianship in a world of machines. Nashville, Tenn., George Peabody College for Teachers, Peabody Library School, 1966. 20 p.

SASTRI, MADAGULA I.
A linguistic approach to relevance judgment. Cleveland, Ohio, Case Western Reserve University, Center for Documentation and Communication Research, 1967. 14 p. (Comparative Systems Laboratory, Technical report, no. 12.)

SHAW, THOMAS S., *ed., and* SHAW, ELIZABETH MILLER, *comp.*
Directory of document librarians in the United States. Chicago, Ill., American Library Association, Interdivisional Committee on Public Documents, 1967. [3], 93 p. $1.00.

STEFEN, RUDOLF
Mikroverfilmung als gesetzlich zugelassenes Archivmittel [Microfilm as a legally acceptable record]. Copied from *Haus der Technik-Vortragsveröffentlichungen,* no. 80, 1966, p. 3–13.

TAYLOR, ROBERT S.
Final report on curriculum development in the information sciences: recommended courses and curricula. Bethlehem, Pa., Lehigh University, Center for the Information Sciences, 1967. 48 p. (Curriculum for the Information Sciences, report no. 12.)

TAYLOR, ROBERT S.
Question-negotiation and information-seeking in libraries. Bethlehem, Pa., Lehigh University, Center for the Information Sciences, 1967. 99 p. table, diagrs. (Studies in the Man-System Interface in Libraries, report no. 3.)

TOMLINSON, G. E., *and* STANNETT, ANNETTE
Information techniques: an interim bibliography with special reference to the construction industry. London, Ministry of Public Building and Works, 1967. [4], 95 p.

TSANG, ALFRED K. B.
Information retrieval—a low cost system. New York, American Society of Mechanical Engineers, [1966]. 8 p. diagrs. $ .50 (75¢ members).

UNITED STATES. Federal Library Committee
Bibliography: new library buildings, 1960–67, prepared by Jess A. Martin. Washington, D.C., the Committee, 1967. 5 p.

VOOS, HENRY
Organizational communication: a bibliography. New Brunswick, N.J., Rutgers University Press, 1967. 251 p. $10.00. Bibliography for group communication survey, 1956–1966, on importance of communication to both military and commercial establishments. Laboratory techniques should be applied to real situations. Literature on electronic communication, family and student groups, and communication of technical information is excluded.

WALKER, JERRY L.
A study of student teachers' knowledge of library resources and services. [Chicago, Ill., Knapp School Libraries Project], 1967. 11 p.

WALLENIUS, ANNA-BRITTA, *ed.*
Library work in Africa. Uppsala, Sweden, Scandinavian Institute of African Studies, 1966. 75 p. 13*s* 6*d.*

*WANDSWORTH PUBLIC, EDUCATIONAL AND TECHNICAL LIBRARY SERVICES [WANDPETLS]
WANDPETLS Directory. London, the Services, [1967]. 58 p.

WILLIAMSON, DEREK
Bibliography: historical, analytical and descriptive. London, Clive Bingley, 1967. 129 p. 25*s.*

*WINCKLER, PAUL A., *comp.*
Library periodicals directory: a selected list of periodicals currently published throughout the world relating to library work. New ed. Brookville, N.Y., Long Island University, 1967. v, 76 p. $5.00.

YERKE, THEODOR E.
Adapting library computer programs to individual documentation. Copied from Proceedings of the 2nd Annual Water Resources Conference, University of Chicago, Ill., November 20–22, 1967, p. 432–40.

Articles and Papers

[A.L.A. Conference, San Francisco, June 25–July 1, 1967: special issue]. *ALA Bulletin,* vol.61, no.7, July–August 1967.

AMMUNDSEN, VIBEKE
Skandiaplankomitéen for tekniske biblioteker. [The Scandia-Plan Committee for technological university libraries.] *Tidskrift för Dokumentation,* vol.23, no.4, 1967, p.45–8

ARIES, PHILIPPE
Préparation d'index par un ordinateur a l'Institut Français de Recherches Fruitières Outre-mer (IFAC). *Bulletin des Bibliothèques de France,* vol.12, no.8, August 1967, p.297–312.

AVERAGE book prices. *Library Association Record,* vol.69, no.8, August 1967, p.277–81.

BERGEN, DAN
The communication system of the social sciences. *College and Research Libraries,* vol.28, no.4, July 1967, p.239–52.

BLANKENSTEIN, GERD
Hierarchische Struktur eines Thesaurus, Fachsystematik und Klassifikation. [Hierarchical structure of a thesaurus, subject grouping and classification.] *ZIID-Zeitschrift,* vol.14, no.5, October 1967, p.138–40.

BORKOWSKI, CASIMIR
An experimental system for automatic identification of personal names and personal titles in newspaper texts. *American Documentation,* vol.18, no.3, July 1967, p.131–8.

BOTSFORD, KEITH
The National Translation Center (U.S.A.). *Babel,* vol.13, no.3, 1967, p.132–6.

BUCHANAN, J. R., *and* HUTTON, F. C.
Analysis and automated handling of technical information at the Nuclear Safety Information Center. *American Documentation,* vol.18, no.4, October 1967, p.235–41.

BUICK, W. G.
The classification of English literature. *Australian Library Journal,* vol.16, no.4, August 1967, p.174–7.

COLVIN, LAURA C.
Cataloging—study and teaching (excerpts and conclusions). *Library Resources and Technical Services,* vol.11, no.3, Summer 1967, p.363–76.

CONCHUBHAIR, SEAMUS S. O.
Library education in Ireland. *Leabharlann,* vol.25, no.3, September 1967, p.92–8.

CONNOR, JOHN M.
Medical librarian trainee program in a medical society library. *Special Libraries,* vol.58, no.6, July–August 1967, p. 428–9.

COOPER, MARIANNE, *and* COOPER, HENRY W.
Interpreting results of statistical studies. *College and Research Libraries,* vol.28, no.4, July 1967, p.266–8.

CORNAZ, M. L.
The Swiss School for Librarians. *Unesco Bulletin for Libraries,* vol.21, no.5, September–October 1967, p.261–2, 278.

DE MOLL, W.
Stencil duplicators. *Office Machine Guide,* no.58, September 1967, p.3–12.

DE VARENNES, ROSARIO
Computerized serials record at Laval University: a progress report. *Canadian Library,* vol.24, no.2, September 1967, p.122–3.

DUCHAC, KENNETH F.
Evaluation of the processing centres. *Library Trends,* vol.16, no.1, July 1967, p.14–22.

EVANS, A. J., *and* WALL, R. A.
Library mechanisation projects at Loughborough University of Technology. *Program,* no.6, July 1967, p.1–4.

FASANA, PAUL J., *and* FALL, JAMES E.
Processing costs for science monographs in the Columbia university libraries. *Library Resources and Technical Services,* vol.11, no.1, Winter 1967, p.97–114.

FIRSOV, G. G.
Die Zentralkatalogisierung in der UDSSR: Kurzer Abriss der Geschichte und des gegenwärtigen Standes. [Centralized cataloguing in the USSR: a summary of the history and the present state of development]. *Zentralblatt für Bibliothekswesen,* vol.81, no.10, October 1967, p.580–604.

FLOOD, BARBARA
Analysis of questions addressed to a medical reference retrieval system: comparison of question and system terminologies. *American Documentation,* vol. 18, no.4, October 1967, p.216–28.

FONOTOV, G.
The libraries of the U.S.S.R. during the last fifty years. *Unesco Bulletin for Libraries,* vol.21, no.5, September–October 1967, p.240–8.

FRANCIS, F. C., *and* PAGE, B. S.
The National Central Library and the Parry report. *Library Association Record,* vol.69, no.9, September 1967, p.303–4.

FRITZSCHE, HANS JOACHIM
Vorschlage für Massnahmen zur Qualifizierung von Mitarbeitern technischer Fachbibliotheken. [Proposals for measures to train staff of technical special libraries.] *Zentralblatt für Bibliothekswesen,* vol.81, no.8, August 1967, p.464–9.

GENNARO, RICHARD DE
A strategy for the conversion of research library catalog to machine readable form. *College and Research Libraries,* vol.28, no.4, July 1967, p.253–7.

GIPSON, JOHN S.
"Total cost" of acquisitions in a community college. *College and Research Libraries,* vol.28, no.4, July 1967, p.273–6.

GLAZIER, KENNETH M.
United States influence on Canadian universities and their libraries. *College and Research Libraries,* vol.28, no.5, September 1967, p.311–6.

HARTE, ROBERT A.
International Federation for Documentation. *ALA Bulletin,* vol.61, no.8, September 1967, p.986–8.

HAVARD-WILLIAMS, P.
Education for librarianship at Queen's University, Belfast. *Leabharlann*, vol.25, no.3, September 1967, p.105–7.

HELLSTROM, KAJSA
Dokumentalistutbildning. [Documentalist training.] *Tidskrift för Dokumentation*, vol.18, no.4, 1967, p.49–52.

HERSEY, DAVID F., *and* HAMMOND, WILLIAM
Computer usage in the development of a water resources thesaurus. *American Documentation*, vol.18, no.4, October 1967, p.209–15.

HILLBO, GUNHILD
Patentklassifikation. Förbisedda klassifikationssystem i aktuell utveckling. [Patent classification. Unnoticed classification systems and their recent development.] *Tidskrift för Dokumentation*, vol.18, no.4, 1967, p.53–4.

HOW TO BUY AN electro-photographic copier. *Business Equipment Digest*, vol.7, no.10, October 1967, p.116–7, 119–20, 122.

HOFFER, JOE R.
The relationship of natural and social sciences to social problems and the contribution of the information scientist to their solutions. *American Documentation*, vol.18, no.4, October 1967, p.228–34.

HOWES, BRIAN R.
Quis custodiet custodes ipsos? A look at some book reviews. *Australian Library Journal*, vol.16, no.4, August 1967, pp.141–52.

IMMELMAN, R. F. M.
The relationship of branch libraries to the administrative headquarters in a university library. *South African Libraries*, vol.35, no.1, July 1967, p.11–15.

KOVÁCS, MÁTÉ
The planning of research in librarianship in Hungary. *Unesco Bulletin for Libraries*, vol.21, no.5, September–October 1967, p.254–60.

KROGH, KIRSTEN
Training for non-professional library assistants in Denmark. *Library Association Record*, vol.69, no.8, August 1967, p.268–70.

LÉVY, FRANCIS
General economy of a mechanized documentation chain. *Unesco Bulletin for Libraries*, vol.21, no.5, September–October 1967, p. 230–9.

LIEBAERS, HERMAN
The international librarian. *Unesco Bulletin for Libraries*, vol.21, no.2, March–April 1967, p.93–7.

LOHMANN, OTTO
The subject-cataloguing of the contents of periodicals as a task of comprehensive libraries. *Libri*, vol.17, no.2, 1967, p.95–103.

LUCAS, MARY BISSET
MEDLARS or the Medical Literature Analysis and Retrieval System. *South African Libraries*, vol.35, no.1, July 1967, p.11–6.

MOOKERJI, S.
Indian Library Association (ILA): In prospect and retrospect. *Indian Librarian*, vol.22, no.1, June 1967, p.41–52.

MOOKERJI, S.
Professional education in India—its norm. *Indian Librarian*, vol.22, no.1, June 1967, p.5–8.

MULLER-SAALA, HEINZ
Mikrofilm im Patentdienst. [Microfilm in the patent service.] *Reprographie*, vol.7, no.10, October 1967, p.185–8.

MURDOCK, JOHN W., *and* LISTON, DAVID M.
A general model of information transfer: theme paper 1968 Annual Convention. *American Documentation*, vol.18, no.4 October 1967, p.197–208.

NEW, P. G.
Student selection at N.W.P. *Library World*, vol.69, no.806, August, p.37–40.

O'CONNOR, JOHN
Relevance disagreements and unclear request forms. *American Documentation*, vol.18, no.3, July 1967, p.165–77.

OROSZ, GABOR
Az eto Alkalmazása a gépesitett dokumentációs és könyvtari munkában. [The application of the Universal Decimal Classification for the mechanization of documentation and library work.] *Tudományos es Muszaki Tájékoztatás*, vol.14, no.8, August 1967, p.341–65.

PACKMAN, JAMES
The library of the University of Ife, Nigeria. *IATUL Proceedings*, vol.2, no.3, August 1967, p.3–6.

PANGBORN, MARK W.
Librarians in geoscience. Copied from *Geotimes*, vol.12, no.4, April 1967, p.20.

PELTZ, MARGARETA, *and* STEFANESCU, MARINA
Elaborarea unor liste de termeni normalizati in domeniul geologiei si al stiintelor conexe. [Drawing up lists of standardized terms in the domain of geology and related sciences.] *Probleme de Documentare si Informare*, vol.1, no.7, July 1967, p.413–22.

PENNA, CARLOS VICTOR
Planning library services. *Unesco Bulletin for Libraries*, vol.21, no.2, March–April 1967, p.60–92.

PHIPPS, MARGARET
Rapid information. Reprinted from *Business Equipment Digest*, September 1967, 2 p. Details of Definac indexing system at Vinyl Products, using a coloured tagging method.

PITCHER, G. M.
The University of Science and Technology Library, Kumasi. *IATUL Proceedings*, vol.2, no.3, August 1967, p.6–8.

POGGENDORF, D.
Working Conference of the German Association of Special Libraries at Stuttgart. *IATUL Proceedings,* vol.2, no.3, August 1967, p.13–14.

POWER, ELLEN
Education for librarianship at University College, Dublin. *Leabharlann,* vol.25, no.3, September 1967, p.99, 101–3.

PROFET, KAREN
Document storage and retrieval. *SDC Magazine,* vol.10, no.9, September 1967, p.1–11.

RAUTENBERG, H. J.
Probleme der Reportliteratur. [The problem of report literature.] *Dokumentation Fachbibliothek Werksbücherei,* vol.15, no.6, September–October 1967, p.175–8.

RISTOW, WALTER W.
The emergence of maps in libraries. *Special Libraries,* vol.58, no.6, July–August 1967, p.100–19.

SAVAGE, T. R.
The interpretation of SDI data. *American Documentation,* vol.18, no.4, October 1967, p.242–6.

SCHOLES, A. K.
Storage and retrieval of technical information. *South African Libraries,* vol.35, no.1, July 1967, p.19–25.

SEELY, PAULINE A.
ALA filing rules—new edition. *Library Resources and Technical Services,* vol.11, no.3, Summer 1967, p.377–9.

SHAKESPEARE concordances by computer. *Bookseller,* no.3219, 2nd September 1967, p.1564–5.

SILBERNAGEL, GÜNTER
Anwendung der Logik auf die Lösung von Thesaurus-problemen. [Application of logic to the solution of thesaurus problems.] *ZIID-Zeitschrift,* vol. 14, no.5, October 1967, p.140–2.

SINOGOWITZ, BERNHARD
Bibliothekskopie und Urheberrecht. [Library copying and copyright.] *Zeitschrift für Bibliothekswesen und Bibliographie,* vol.14, no.4, 1967, p.207–18.

SNEL, R.
Co-ordinate indexing as a decision-device in every business cycle. 4 p. Reprinted from *Särtryck ur T. Dokument,* vol.23, no.3, 1967.

SOCIAL science at Boston Spa. *Nature,* vol.216, no.5111, 14th October 1967, p.111.

SOMMER, ROBERT, *and* PETERSON, PEGGY
Study carrels re-examined. *College and Research Libraries,* vol.28, no.4, July 1967, p.263–5, 272.

SVIRIDOV, F. A.
A nemzetközi dokumentacios szovetseg szerepe és tevékenysége. [The role and activities of the International Federation for Documentation (FID)]. *Tudományos es Muszaki Tájékoztatás,* vol.14, no.8, August 1967, p.513–24.

USPENSKIJ, V. A.
K probleme transliteratsii russkikh tekstov Latinskimi vukvami [The problem of transliteration from Russian into Roman alphabets] *Nauchno-Tekhnicheskaya Informatsiya,* series 2, no.7, 1967, p.12–20.

VAJDA, ERIK
Peremlyukkártyák alkalmazása könyvtári beszerzési nyilvantartások céljaira. [The use of edge punched cards for registering library acquisitions]. *Tudományos es Muszaki Tájékoztatás,* vol.14, no.8, August 1967, p.525–40.

VAN BLOKLAND, G. G.
Het 'selectie'-probleem in de literatuurinformatie: technisch of manselijk probleem. [The selection problem in literature information; a technical or a human problem.] *Tijdschrift voor Efficiëntie en Documentatie,* vol.37, no.10, October 1967, p.692–7.

VEANER, ALLEN B.
Developments in copying methods and graphic communication, 1966. *Library Resources and Technical Services,* vol.11, no.3, Summer 1967, p.330–41.

WEISS, IRWIN J., *and* WIGGINS, EMILIE V.
Computer-aided centralized cataloguing at the National Library of Medicine. *Library Resources and Technical Services,* vol.11, no.1, Winter 1967, p.83–96.

WELSH, WILLIAM J.
Considerations on the adoption of the Library of Congress Classification. *Library Resources and Technical Services,* vol.11, no.3, Summer 1967, p.345–53.

WHITE, H. L.
The national library in the Australian community. *Canadian Library,* vol.24, no.1, July 1967, p.36–41.

WIJN, J. H. DE
D.K.-handausgabe: een nieuwe ontwikkeling in de UDC. [D.K.-Handbook: a new development in the U.D.C.]. *Tijdschrift voor Efficiëntie en Documentatie,* vol.37, no.10, October 1967, p.700–1.

WILD, C.
Notes on copyright. *Technical Publications Journal,* vol.4, no.4, October 1967, p.177, 179.

WORSLEY, PETER
Libraries and mass culture. *Library Association Record,* vol.69, no.8, August 1967, p.259–67, 270.

WYNAR, BOHDAN S.
Reference theory: situation hopeless but not impossible. *College and Research Libraries,* vol.28, no.5, September 1967, p.337–42.

YAKUSHIN, B. V., *and* BITMAN, V. B.
Ov odnom podkhode k pazravotke metodiki postroeniya tezaurisa. [A method for the construction of thesauri.] *Nauchno-Tekhnicheskaya Informatsiya,* series 2, no.7, 1967, p.8–11.

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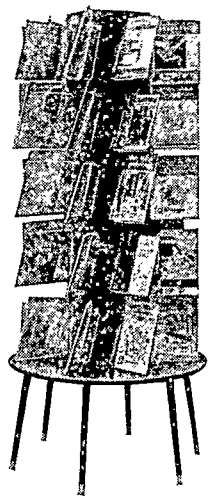

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